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Economic Impact Analysis of Effluent Limitations and Standards for the Leather Tanning Industry

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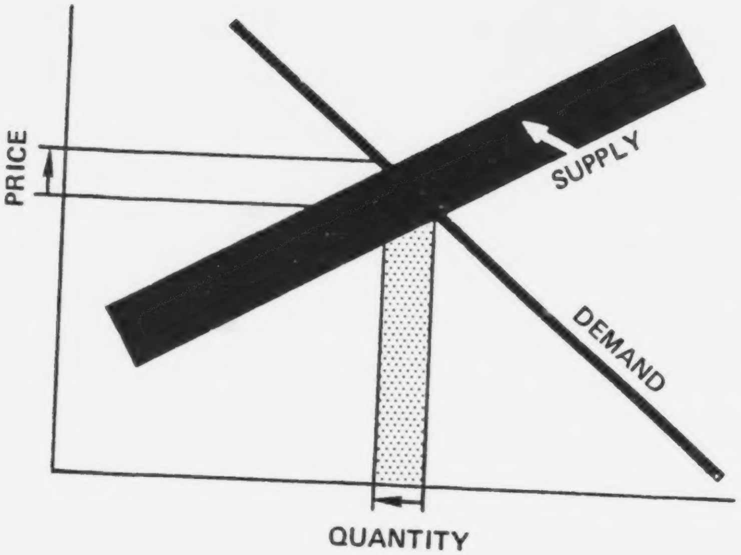

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This document is an economic impact assessment of the recently-issued effluent guidelines. The report is being distributed to EPA Regional Offices and State pollution control agencies and directed to the staff responsible for writing industrial discharge permits. The report includes detailed information on the costs and economic impacts of various treatment technologies. It should be helpful to the permit writer in evaluating the economic impacts on an industrial facility that must comply with BAT limitations or water quality standards.

The report is also being distributed to EPA Regional Libraries, and copies are available from the National Technical Information Service (NTIS), 5282 Port Royal Road, Springfield, Virginia 22161 (703/487-4600).

If you have any questions about this report, or if you would like additional information on the economic impact of the regulation, please contact the Economic Analysis Staff in the Office of Water Regulations and Standards at EPA Headquarters:

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EPA issued final effluent guidelines and limitations for the leather tanning industry in November 1982 (47 FR 52848). This report estimates the economic impact of pollution control costs in terms of the effects on profitability, plant closure, unemployment, price changes and foreign trade. A model plant approach is used to assess these impacts for nine tanning subcategories, with separate models for direct and indirect dischargers. Closures are determined on the basis of after compliance net present values and the ability of companies to repay loans for pollution control. Closures are projected both for cases in which requirements apply to all dischargers, as well as for options in which small firms in some subcategories would be excluded from certain requirements to alleviate economic impacts. As background for the impact analysis, the report contains chapters on the structure of the industry, a financial characterization of the industry, and an analysis of price determination in the hide and leather markets. Impacts are assessed for BPT, BAT, PSES and new source standards. A separate chapter analyzes impacts on small business.

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ECONOMIC IMPACT ANALYSIS OF EFFLUENT LIMITATIONS AND STANDARDS FOR THE LEATHER TANNING INDUSTRY

U.S. Environmental Protection Agency
Office of Analysis and Evaluation
Washington, D.C. 20460

November 1982

EPA 440/2 82-018

PREFACE

This document is a contractor's study prepared for the Office of Water Regulations and Standards of the Environmental Protection Agency (EPA). The purpose of the study is to analyze the economic impact which could result from the application of effluent standards and limitations issued under Section 301, 304, 306 and 307 of the Clean Water Act to the leather tanning and finishing industry.

The study supplements the technical study (EPA Development Document) supporting the issuance of these regulations. The Development Document surveys existing and potential waste treatment control methods and technology within particular industrial source categories and supports certain standards and limitations based upon an analysis of the feasibility of these standards in accordance with the requirements of the Clean Water Act. Presented in the Development Document are the investment and operating costs associated with various control and treatment technologies. The attached document supplements this analysis by estimating the broader economic effects which might result from the application of various control methods and technologies. This study investigates the effect in terms of product price increases, effects upon employment and the continued viability of affected plants, effects upon foreign trade and other competitive effects.

The study has been prepared with the supervision and review of the Office of Water Regulations and Standards of EPA. The work was started under Contract No. 68-01-4632 and completed under Contract No. 68-01-5858 by Development Planning and Research Associates, Inc. (DPRA). The report was prepared by Donald J. Wissman, Richard E. Seltzer and Arthur C. Barker of DPRA and completed in November 1982.

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I. INTRODUCTION

The Environmental Protection Agency is charged with the responsibility to restore and maintain the chemical, physical and biological integrity of the nation's waterways. This authority is granted under the Clean Water Act (the Federal Water Pollution Control Act Amendments of 1972 as amended by the Clean Water Act of 1977). Section 301(b)(1)(A) of the Act requires that all industries discharging into navigable waterways achieve the "best practicable control technology" (BPT). These same dischargers are required to meet effluent limitations achievable by the application of "best available technology economically achievable" (BAT) and best conventional pollutant control technology pursuant to Sections 301(b)(2)(A), (b)(2)(C) and (b)(2)(E). Additionally, new industrial dischargers are required to comply with the New Sources Performance Standards (NSPS) under Section 306 of the Act, and new and existing industrial dischargers to publicly owned treatment works (POTW's) are subject to Pretreatment Standards under Sections 307(b) and 307(c) of the Act. The purpose of this study is to assess the economic impacts of these requirements on the leather tanning and finishing industry.

A. Scope of this Report

EPA proposed regulations on July 2, 1979, to limit effluent discharge from the leather tanning industry to public waterways and limit the introduction of pollutants into publicly owned treatment works. Additional information, both technical and economic, has been developed since the proposed standards were made public. As a result, on June 2, 1982, the Agency made available for public review this data. EPA requested comments on these supplementary record materials and on the Agency's preliminary analysis of how these materials might influence final rulemaking.

B. Organization of this Report

This draft report includes a total of nine chapters. The methodology used in estimating the economic impacts of the various control options for the effluent limitation guidelines pretreatment standards and new source performance standards is defined in Chapter II. In general, model plants were developed to represent the various sizes and types of plants found in the industry. A net present value analysis was then employed to determine the economic and financial impacts of the regulatory alternatives.

Chapters III, IV, and V deal with various aspects of the industry background such as the structure of the industry including the number, sizes and types of plants and employment characteristics. A financial profile of the industry and a discussion of prices and price determination are also included. Chapter VI describes the representative model plants and how they are related to the total industry.

The treatment alternatives are briefly discussed in Chapter VII, along with the investment and operating cost for each alternative. Various alternatives are developed for each size and type of plant. The economic impacts are described in Chapter VIII. For each control alternative considered, the specific types of economic impacts that are examined in this report include:

1) Price Effects
2) Financial Effects
3) Production Effects
4) Secondary Production Effects
5) Community Effects
6) Balance of Payment Effects
7) Effects on New Sources

C. Data Sources

Data utilized in the preparation of this report were obtained from both primary and secondary sources. Primary sources were those associated with the industry itself and included tanneries and trade associations. Secondary sources were publications prepared by the government, industry, and private institutions. Some of the more relevant data and data sources are discussed below.

1. Primary Data Sources

Information acquired directly from tanneries or from representatives of the industry are considered primary data. The major sources of primary data in this study included an industry survey, plant visits, and informal discussions with industry representatives.

The initial survey was conducted in 1976 under the Authority of Section 308 of the Clean Water Act and used in the development of the economic analysis for proposed standards as published in July of 1979. 1/ A follow-up survey was conducted by the Agency in 1980 and additional data were obtained from this survey. Also, plant visits were made to all direct dischargers. The information obtained from the follow-up survey and plant visits was used to establish a more complete data base and update the model plant financial profiles from 1977 to 4th quarter 1979.

1/ Complete details of the industry survey are contained in the 1979 report: Economic Impact Analysis of Proposed Effluent Limitations Guidelines, New Source Performance Standards and Pretreatment Standards for the Leather Tanning and Finishing Point Source Category, EPA-400/2-79-019, July, 1979.

Visits to the tanneries allowed the Agency to gain an important insight into the operational and managerial characteristics of these plants. These visits were coordinated through the Tanners' Council of America, the industry's trade organization.

2. Secondary Data Sources

The published data utilized in this analysis were obtained from both public and private sources. The Tanners' Council publishes annually the U.S. Leather Industry Statistics which contains data on industry volumes, prices, imports, and exports. Major public sources of information included the Annual Survey of Manufactures and the Census of Manufactures, both published by the Bureau of Census, U.S. Department of Commerce. These and other secondary data sources were utilized throughout this analysis to depict historical trends and to supplement and verify information from primary sources. This latter use of secondary information was particularly important in the development of the financial model plants to assure the representativeness and accuracy of the models. A complete listing of the secondary sources used in the development of this report is contained in the Bibliography.

II. METHODOLOGY

The methodological approach utilized to assess the likely economic impact of the regulations on the leather tanning industry is summarized in this chapter. In this impact study, economic impact is defined as the difference between (1) the projections of the likely effects on a plant, a local area, the United States, and on foreign activity which would result from an industry's compliance with a given level of effluent limitations and standards and (2) the projection of industrial activity and changes which would likely occur in the absence of effluent limitations and standards (baseline conditions).

In particular, the principal economic variables of interest in this study are:

(1) price effects
(2) profitability
(3) number, size, and location of plants that can be expected to close or curtail employment,
(4) changes in employment,
(5) community impacts,
(6) dislocation effects,
(7) balance of trade consequences,
(8) other impacts.

In the case of best available technology economically achievable (BAT) and pretreatment standards for existing sources (PSES), the analysis focuses on price increases, plant closings, curtailments of production, dislocations of production, unemployment, community impacts, and balance of trade effects. For new source performance standards (NSPS) and pretreatment standards for new sources (PSNS), the impacts are assessed in terms of the effects on industry growth, prices, plant locations (i.e., domestic or foreign production), and balance of trade. The specific bases for effluent control relating to the leather tanning industry are described in detail in a separate EPA report. 1/

1/ Final Development Document for Effluent Limitations Guidelines New Source Performance Standards and Pretreatment Standards for the Leather Tanning and Finishing Industry Point Source Category, U.S. Environmental Protection Agency, EPA 440/11-82-016, November 1982.

Several interrelated analyses were used to evaluate likely economic impacts resulting from effluent control requirements on the leather tanning industry. These in-depth analyses included: (1) a characterization and subcategorization of the technical and economic structure of the industry, (2) a description of the financial profile of the industry, (3) the construction of representative model plants, (4) an evaluation of pricing patterns within the industry, (5) a description of the technological options for meeting designated levels of pollution control and the costs associated with each option, and (6) the analysis of economic impacts.

The overall analysis, however, was not a simple sequential one; rather, it employed interacting feedback steps. The schematic of the analytical approach is shown in Exhibit II-1. Due to the fundamental causal relationships among the financial and production effects and other impacts, a greater emphasis was devoted to plant closure analysis.

A. Industry Structure and Subcategorization

The industry structure and subcategorization analysis primarily involved describing and segmenting the industry in terms of its past and current economic characteristics in order to provide an information base for the subsequent analytic steps. In particular, the information on industry characteristics was useful in determining an appropriate disaggregation design for industry subcategorization. This delineation of industry subcategories served as the basis for the definition and construction of representative model plants and the determination of the wastewater treatment technological options and costs appropriate to each.

B. Financial Profile of the Industry

The ability of firms within the industry to comply with various levels of pollution control was determined, in part, by the past and expected financial conditions of those firms. Under the heading "financial profile of the industry," various factors were studied to develop insight into the financial characteristics of actual plants in the industry. Much of the data compiled in this section was also useful in determining the financial profiles of representative model plants.

Key financial statistics include after-tax profit as a percent of sales, after-tax profit as a percent of invested capital, sales to total assets ratios, sales per employee, assets per employee, and after-tax profit to net worth. Other financial factors are studied with respect to the ability of firms to generate funds to finance investment for effluent management, either internally through cash flow or externally through new debt or equity issues. The data compiled in this phase of the analysis provide an information base useful for projecting key technical and economic factors and for carrying out subsequent economic impact analysis.

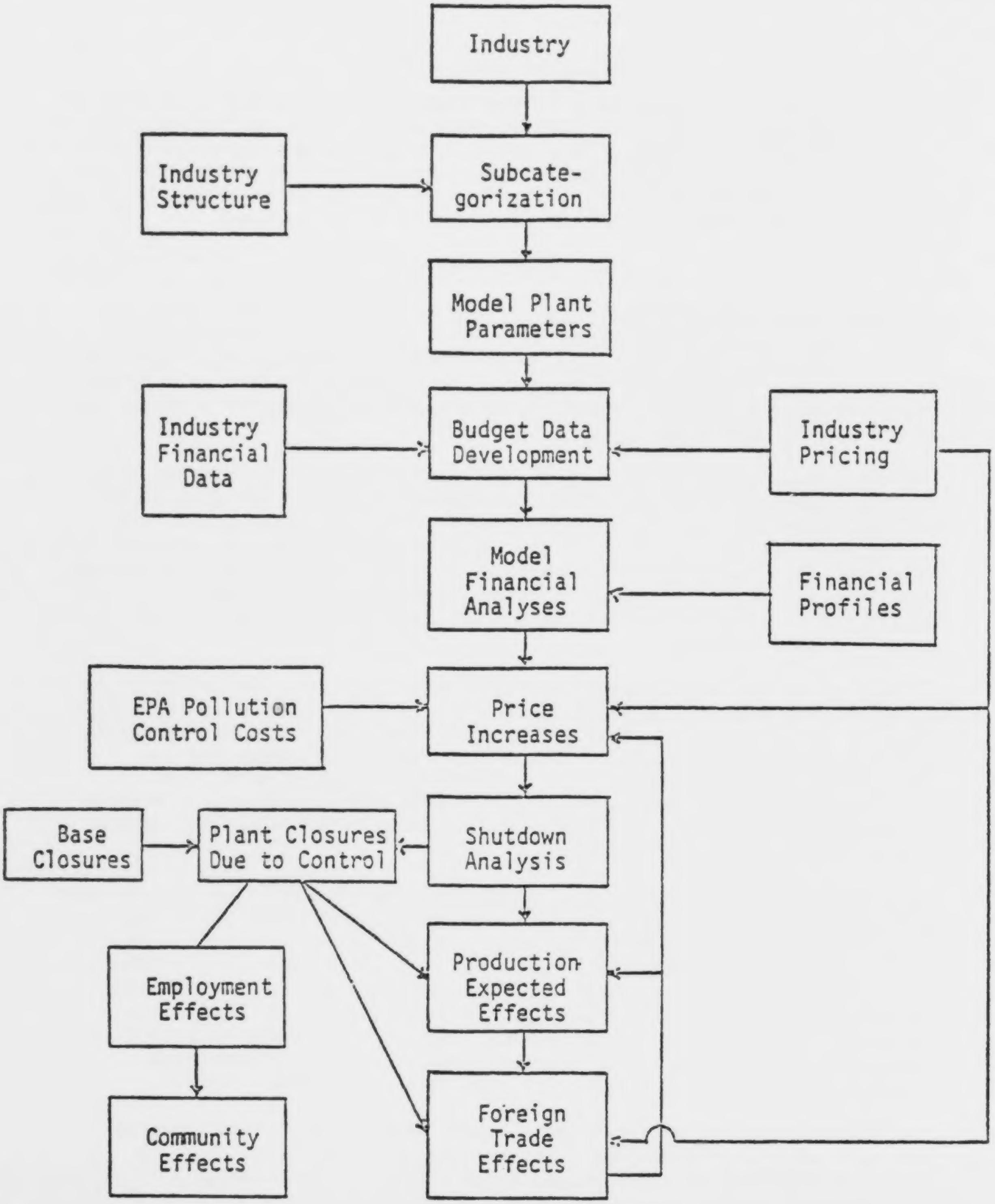
Industry
Industry Structure
Subcategorization
Model Plant Parameters
Industry Financial Data
Budget Data Development
Industry Pricing
Model Financial Analyses
Financial Profiles
EPA Pollution Control Costs
Price Increases
Base Closures
Plant Closures Due to Control
Shutdown Analysis
Employment Effects
Production Expected Effects
Community Effects
Foreign Trade Effects

Exhibit II-1. Schematic of economic impact analysis of effluent control guidelines

C. Pricing Patterns

The analysis of pricing patterns in the leather tanning industry focused on factors determining supply and demand. Market structure and the nature of competition were evaluated, a step which, for the leather tanning industry, involved the influence that international markets and competition exert on the domestic industry's prices. Finally, the ability of impacted plants to recover the increased costs of pollution controls was assessed.

D. Model Plants

The model plant analysis used is a systematic framework within which to assess likely economic impacts on individual types and sizes of actual plants within the industry. Usually more than one model plant is required for an industry in order to represent various types and sizes of existing plants or plants which are likely to be constructed after the promulgation of effluent control guidelines.

The model plant profiles represent a variety of financial, economic, and technical variables such as sales, investment, fixed and variable costs, profits, size, and type of process. The profiles are constructed from information and data gathered in the industry characterization phase of the analysis. This information is generally obtained from the industry survey, plant visits, discussions with industry representatives, trade publications, other secondary data sources, and from engineering cost-synthesis methods.

In developing the model plants, the best data source was the industry surveys which provided detailed financial data from the various types and sizes of existing firms. However, data obtained from the industry surveys were compared with published financial information to assure the reliability of the data contained in the surveys. Also, data from published sources are available annually which allow historical trends to be considered and enable the industry's financial situation to be updated without resurveying the industry.

Thus, the model plants were developed by considering data from both primary and secondary sources. In a typical development of a model plant, key economic/financial data (e.g. sales, production costs, margins, asset structure) are collected from numerous sources and converted to a common base. These data are, in turn, analyzed and compared, considering also nonquantifiable aspects of the industry, to determine the appropriate parameter to use for the particular model plant. The consolidation of the various parameters results in the depiction of the key economic and financial components in the form of a representative model plant.

The applicability of utilizing model plant data for assessing expected economic impacts of pollution controls rests principally on the representativeness of the selected model plant(s). For example, "economies-of-scale" in production are often present in processing plants, e.g., average unit costs of production are usually lower for large plants than for medium or small plants of the same type. Furthermore, there are expected economies-of-scale in waste treatment, which, in effect, will compound the economies-of-scale relationships among differing sizes of plants.

In general, economies-of-scale relationships in pollution control costs have been demonstrated, and this alone necessitates multiple model plant analyses to evaluate differential economic effects. Other processing factors, e.g., type of manufacturing process employed (technology) may also affect processing costs and wasteflows. This again may necessitate a further segmentation of an industry and the inclusion of additional model plants for a more comprehensive analysis.

E. Waste Treatment Technological Options and Costs

Waste treatment options and their associated costs are obviously instrumental in the assessment of the economic impacts of water pollution controls. In general, basic technical and cost data were developed specifically for various types and sizes of model plants using the appropriate discharge method (direct or indirect). This analysis also examined model plants reflecting new facilities which were projected most likely to be built after the promulgation of the guidelines. In determining appropriate options and costs, it was necessary to specify 1) the types of discharge in each industry segment, and 2) the types and proportions of effluent systems in place. This information was developed as part of the Agency's engineering analysis.

Cost data includes estimated investment costs for various treatment options for each model plant and their respective estimated annual operating and maintenance costs based upon normal operating rates or annual production capacity.

F. Analysis of the Economic Impacts

Fundamentally, the impact analysis was similar to that usually required for any capital budgeting study of new investments in which the problem is one of deciding whether a commitment of time or money to a project is worthwhile in terms of the expected benefits. The analysis was complicated by the fact that benefits and investments will accrue over a period of time and that, in practice, the analyst cannot reflect all of the required imponderables in making future projections. The industry segments were described in the form of financial budgets of model plants. Key non-quantifiable factors were considered in the interpretation of the quantified data.

This study's economic impact analysis required the establishment of a basecase of industry conditions that would prevail without pollution controls in order to estimate the consequent economic impact of pollution controls by showing the change from this basecase attributable to their imposition. In particular, the Agency estimated the number of plants that will be subject to these regulations, since some tanneries are expected to close before the regulations become effective.

1. Price, Supply and Demand Impact Analyses

Price and supply and demand impact analyses necessarily have to proceed simultaneously. In order to evaluate these impacts, two types of analyses were used: one--the micro level--utilized the model plant as the basis of the analysis to arrive at price increases required to maintain profitability levels; the other--the industry level--utilized supply and demand analysis.

Application of the Net Present Value (NPV) procedure to these costs yielded the present value of pollution control costs (i.e., investment plus operating cost less tax savings). (This NPV procedure is discussed in a following section.) When this was known, the price increase required to pay for pollution control could readily be approximated by the formula: 1/

$$X = \frac{(PVP)\ (100)}{(1-T)\ (PVR)}$$

where:

X = average required percentage increase in price over the planning period
PVP = present value of pollution control costs after taxes
PVR = present value of gross revenue starting in the year pollution control is imposed
T = average tax rate

Since the program calculates the price increase required by period, an average price increase over the five-year period following installation of the control facilities was used.

The required price increase or the increase in cost of production at the plant level was evaluated in light of the price elasticities of the commodity involved and the competitive structure of the industry. This represented the second approach using supply and demand analysis. The supply and demand analysis provided some insights into likely quantities and supply responses to different prices. This allowed a preliminary estimate of the production and price impacts of pollution control costs. Following this, further analysis at the micro level was performed to obtain a more detailed insight into the plants' responses to expected price changes, cost absorption, or plant closure (the plant closure criteria are discussed in Section 3, below). The indicated plant shutdowns were then aggregated to test whether or not the lost production could be absorbed by the remaining capacity or whether such curtailments would increase prices.

1/ The above procedure is conceptually correct where an average tax rate is used. However, to insure accuracy in the machine program where the actual tax brackets were incorporated, a more detailed iterative process was developed.

2. Financial Impact Analysis

The financial impact analysis involved the preparation of pro forma income statements and cash flow statements (including computations of the models' net present values) following the assessment of the likely price change. The analysis provided estimates of profitability with and without pollution control costs and also provided information relative to the ability of the industry to finance this investment and estimated financial requirements. The ability to finance plant investment for pollution control could have a definite bearing on judgments and estimates with regard to likely plant closures.

3. Production, Plant Closures and Employment Analysis

The core analysis for this study was based upon synthesizing the physical and financial characteristics of the various industry segments through representative model plant projections. Estimated financial profiles and cash flows are presented in the model plant chapter. The primary factors involved in assessing the financial and production impact of pollution control were profitability changes--a function of the cost of pollution control and a plant's ability to pass along these costs in the form of higher prices.

a. Model plant impact analysis

This study's analytical techniques are sufficient to provide useful and reliable insight into such potential business responses to required investment and operating costs for pollution control facilities. In reality, however, these decisions are seldom made as a set of well-defined and documented economic rules. They include a wide range of personal values, external forces such as the inability to obtain financing, or the relationship between a dependent production unit and its larger cost center whose total costs must be considered.

Such circumstances include but are not limited to the following factors:

(1) Inadequate accounting systems or procedures. This is especially likely to occur in small, independent plants which do not have effective cost accounting systems.

(2) Inefficient production units. This is particularly true of plants where the equipment is old and fully depreciated, and the owner has no intention of replacing or modernizing it. Production continues as long as labor and materials costs are covered until the equipment fails entirely.

(3) Personal values and goals associated with business ownership that override or constrain rational economic rules. This complex of factors may be referred to as the value of psychic income.

(4) Production dependence. This is characteristic of a plant that is a part of a larger integrated entity which either uses raw materials being produced profitably in another of the firm's operating units or supplies raw materials to another of the firm's operations where the source of supply is critical. When the profitability of the second operation more than offsets the losses in the first plant, the unprofitable operation may continue indefinitely because the total enterprise is profitable.

(5) Temporary unprofitability. This may be found whenever an owner-operator expects that losses are temporary and that adverse conditions will change. His ability to absorb short-term losses depends upon his access to funds through credit or personal resources not presently utilized.

(6) Low (approaching zero) opportunity costs for the fixed assets and for the owner-operator's managerial skills and labor. As long as the operator can meet labor and materials costs, he will continue to operate. He may even operate with gross revenues below variable costs until he has exhausted his working capital and credit.

(7) Plant-site appreciation. This factor is important in those situations where the value of the land on which the plant is located is appreciating at a rate sufficient to offset short-term losses.

These factors are generally associated with proprietorships and closely held enterprises such as many of the leather tanning firms rather than with publicly held corporations.

Although the above factors are present in and relevant to business decisions, they are not always susceptible to quantifiable analysis. Thus, this studies analytical techniques were designed to provide insite into such potential business responses. Accordingly this analysis of the model plants' impacts was primarily based on the determination of the model plants' net present values (NPV) both before and after expenditures for controls. This NPV analysis was then combined with considerations for unique influencing factors (such as those listed above) so that its assessment of impacts reflects, as accurately as possible, the responses actual businesses will make.

The computation of the net present values in such an analysis involves the discounting of the models' cash flows over some period of time (in this analysis 21 years) through the discounting function:

$$NPV = \sum_{n=1}^{t} A_n (1+K)^{-n} - I_o$$

where:

NPV = net present value
A_n = the cash flow in the n^{th} year
K = discount rate (after-tax cost of capital)
n = number of the conversion period, i.e., year 1, year 2, etc.
t = total number of conversion periods (years)
I_o = value of facility for nonconforming uses (salvage value for existing facilities and initial investment for new source facilities)

The resulting net present value indicates the excess of the present value of projected cash flows for an operating facility over the present value of what the equity holders could earn if they liquidated in year zero and invested the resulting money plus any additional investments they would normally be expected to invest to maintain the facility in operation during the time period at the firm's estimated cost of capital. Thus, if the NPV is positive, the equity holders are earning a return which is greater than the model's cost of capital. If the NPV is negative, then the equity holders are earning less than the cost of capital, and in such a situation, they would be better off liquidating, realizing the salvage value in cash 1/, and reinvesting it at the cost of capital.

Model plant NPV's are determined both without and with expenditures for pollution controls. Comparison of the base case (without controls) and the impacted case (with controls) allows the net effects of the controls to be determined. These effects, in combination with other relevant economic considerations, enable overall impacts to be determined.

b. Construction of the model plant cash flow and capital outlays

The cash flow and capital outlays used in this analysis of pollution control costs were constructed in the following manner:

(1) The cash flows were presented in current dollars thus requiring the use of different cash flows for each of the respective years.

(2) For existing model plants, the initial investment was considered to be outlays for the model fixed assets (salvage value) and working capital.

(3) The after-tax cash proceeds were taken for years t_1 to t_n. These were adjusted annually for inflation. A 6 percent annual rate of inflation was used.

1/ Salvage value is defined here as the liquidation value of fixed assets plus working capital, i.e. sold for nonconforming uses.

(4) Annual reinvestment for replacement of depreciated assets was estimated for year t_1 and was adjusted annually to compensate for inflation and the net between reinvestment and depreciation.

(5) Terminal value of the model was taken in year t_n and reflected the salvageable assets plus the net working capital.

(6) Capital outlays for pollution controls were added to the models' total assets in increments, 50 percent in years t_4 and t_5.

(7) Annual pollution control expenses were incurred incrementally in years t_4 and t_5 reflecting the stages of construction completion for the capital outlays. After year t_5, pollution control expenses were adjusted annually for inflation.

(8) Depreciation of depreciable assets was computed utilizing rapid depreciation techniques for tax computations and the straight-line method for the pro forma income statements. Replacement investments of pollution control equipment began in year t_{11}.

(9) No terminal values of the pollution facilities were computed as it was anticipated there would be few, if any, salvageable assets in year t_n.

Base case cash flows consisted of Steps 1 through 5 and excluded investments and annual costs associated with pollution controls. Impacted cash flows consisted of Steps 1 through 9 and reflected the model plant after the imposition of environmental requirements.

In the construction of the cash flow for the net present value analysis, after-tax cash proceeds were defined as:

(1) After-tax income = $(1 - T) \times (R - E - I - D)$

(2) After-tax cash proceeds = $(1 - T) \times (R - E - D) + D$

where:

T = tax rate
R = revenues
E = expenses other than depreciation and interest
I = interest expenses
D = depreciation charges

Depreciation was included only in terms of its tax effect and was then added back to obtain after-tax cash proceeds.

There is a temptation to include outlays for interest payments when computing the cash proceeds of a period. Cash disbursed for interest should not affect the cash proceeds computation. The interest factor is taken into consideration by the use of the present-value procedure. To also include the cash disbursement would result in double counting. The effect of interest payments on income taxes is also excluded from the cash proceeds computation. This was brought into the analysis when computing the effective rate of interest of debt sources of capital, which is used in the determination of the cost of capital.

A graduated federal income tax rate was used reflective of the tax rates for 1979. This amounted to: 17 percent on the first $25,000 of taxable income; 20 percent on taxable income over $25,000 up to $50,000; 30 percent on taxable income over $50,000 up to $75,000; 40 percent on taxable income over $75,000 up to $100,000; and 46 percent on taxable income over $100,000. Investment credits and carryforward and carryback provisions were not used due to their complexity and special limitations. The annual inflation rate used for this analysis was 6.0 percent. This rate reflects, approximately, the annual rate for the past ten years based on the historical implicit price deflators for the gross national product. A period of twenty-one (21) years was selected for the length of time to discount models' cash flows because this period of time was determined to be representative of the useful economic life of actual industry facilities. This length of time represents a complete cycle of the construction period of the control equipment and its useful life. Furthermore, the 21 year period is sufficiently long enough to allow for business cycles and fluctuations to balance out.

While profitability is an important input to the net present value analysis, the overall assessment of a model plant's viability is not dependent only upon the plant's level of profits. The NPV also is determined by the cost of capital (the value of equity to equity holders, etc., as discussed below), used as a discounting rate to equate cash flows at different times. A more common measure of profitability is return on investment (ROI) where after-tax income (as defined in Equation 1) is expressed as a percent of invested capital (book value) or as a percent of net worth. Such measures should not be viewed as necessarily different estimates of profitability when compared to the net present value concept; rather, these should be considered as entirely different profitability concepts. It should be noted that the data requirements for ROI and NPV measures are derived from the same basic financial information, although the final inputs are handled differently for each.

c. Cost of capital - after-tax

Return on invested capital is a fundamental notion in U.S. business. It provides both a measure of the actual performance of a firm as well as its expected performance. In the latter case, it is also called the cost of capital, and this, in turn, is defined as the weighted average of the cost of each type of capital employed by the firm--in general terms--equities and interest-bearing liabilities. Although no methodology yields the precise cost of capital, it can be approximated within reasonable bounds.

Equity capital. Two methods that can be used to estimate the cost of equity capital are the dividend yield method and the earnings stock price (E/P ratio) method. Both are simplifications of the more complex discounted cash flow (DCF) methodology.

The earnings/price ratio method is:

$$c = \frac{E}{P}$$

where:

c = cost of equity capital
E = current earnings per share
P = current stock price

This latter method assumes that future earnings per share will be the same as the current earnings. Since most tanneries do not have current stock prices to calculate on earnings/price ratio, we used an earnings/equity ratio derived from Robert Morris data. The value of equity is used as a surrogate for a stock price. Stock prices generally do not fall below book values, so the cost of equity would not be underestimated using this approach.

Debt Capital. The after-tax cost of debt capital was estimated by using an estimated cost of debt (interest rate) and multiplying it by 0.64 -- assuming a 36 percent tax rate.

$$d = 0.64\ i$$

where:

d = after-tax cost of debt capital
i = before-tax cost of debt (interest rate)

Weighted Cost of Capital. The sum of the cost of equity and debt capital weighted by the respective equity to equity plus debt and total debt to equity plus debt (where debt is long-term debt) ratios yields the estimated average cost of capital (k), after tax. This is depicted below.

$$k = \frac{\text{Equity}}{\text{Debt plus equity}} \times c + \frac{\text{Total debt}}{\text{Debt plus equity}} \times d$$

d. Investment determination

In evaluating the feasibility of new plants, investment is thought of as an outlay for fixed assets and working capital; however, in evaluating closure of an on-going plant, the investment basis is its salvage value (opportunity cost or shadow price). 1/ For this analysis, salvage value was taken as the sum of liquidation value of fixed assets plus working capital (current assets less current liabilities) tied up by the plant. This same amount was taken as a negative investment or "cash out" value in the terminal year.

The rationale for using total shadow priced investment was that the cash proceeds do not include interest expenses which are reflected in the weighted cost of capital. This procedure required the use of total capital (salvage value) regardless of source. An alternative would have been to use as investment, net cash realized upon liquidation of the plant (total cash realized from liquidation less debt retirement). In the single plant firm, debt retirement would be clearly defined. In the case of the multiplant firm, the delineation of the debt by the plant would likely not be clear. Presumably this could be reflected in proportioning total debt to the individual plant on some plant parameter (i.e., capacity or sales). Under this latter procedure, interest and debt retirement costs would be included in the cash flows.

The two procedures will yield similar results if the costs of capital and the interest charges are estimated on a similar basis. The former procedure, total salvage value, was used as it gives reasonable answers and simplified both the computation and explanation of the cash proceeds and salvage values.

Replacement investment was considered to be equal to 100 percent times the annual depreciation. This corresponds to the operating policies of some managements and serves as a good proxy for replacement in an ongoing business.

Investments in pollution control facilities were determined from estimates provided by EPA. Incremental values are used in order to reflect in-place facilities where information is available.

e. Plant closures and production effects

Plant closures may result from the inability of less profitable plants to adequately recover required pollution abatement cost through increased product prices, decreased input prices, or improvements in economic efficiency. Often closures can be anticipated among older, smaller and less efficient plants as a result of economies of scale in pollution control which would lower the overall costs to competing larger operations.

1/ This should not be confused with a simple buy-sell situation which merely involves a transfer of ownership from one firm to another. In this instance, the opportunity cost (shadow price) of the investment may take on a different value.

Since the larger plants, whose unit pollution control costs are usually much less, will be able to afford to sell at a lower price than the smaller high-cost plants, the high-cost plants will have no recourse other than to sell at the long run equilibrium price set by the low-cost plants. Consequently, the older, smaller, less efficient plants would probably and eventually yield to the dominance of the larger, more efficient units. However, in the short run, a plant may continue to operate even when economic considerations indicate closure, especially when the smaller, high-cost plants are protected by regional markets and other non-price impediments to competition from the larger low-cost plants.

Most firms would cease operations if they could not adequately absorb the required wastewater control expenditures. The most obvious measurement of a firm's ability to absorb the costs is its ability to maintain a positive income or cash flow after incurring control expenditures. If incomes are negative, some firms would remain in operation as long as variable costs were covered (positive cash flows); however, the requirements for overhead expenses would eventually cause such firms to cease.

The remaining situation that could arise would be one in which firms maintain positive incomes and generate net present values (NPV of their cash flows at their cost of capital) which are positive. This indicates that these firms are earning a return on their operation which exceeds their cost of capital. If their NPV's are negative then the firms would liquidate, realize salvage value in cash, and reinvest in a more financially viable investment (one which would earn at least their cost of capital).

A review of the potential financial effects of the imposition of wastewater controls on the model indirect discharging plants results in some confusion in the determination of which plants would be forced to close due to an inability to absorb the control expenditures, a confusion which can result from a large number of models and wastewater control treatment alternatives applicable to each model. Accordingly, for this analysis, formalized closure criteria were developed. In the development of these criteria, certain necessary assumptions were made to simplify the interpretation of the impact results.

The closure criteria utilized are depicted below. These criteria basically represent the models' abilities to continue operations after incurring expenditures for wastewater controls.

Model's Viability	Net Present Value	Annual Cash Flow in the 21st Year
Viable	Positive	Positive
Marginal	Slightly Negative 1/	Slightly Negative 1/
Closure	Negative	Negative

1/ The criteria utilized here was that the sum of the cash flow and NPV must be positive. If not, then plant was projected to close.

An additional factor that is considered in determining plant closures is liquidity. Debt capital would not be made available to a plant if it is not profitable and if it is not sufficiently liquid, i.e., the plant has an inadequate cash balance to repay its debt obligation. The liquidity test assesses the firm's ability to make the necessary investment in pollution control facilities and repay its debt obligation. Adequate liquidity is tested by examining the cash flows over an assumed five year loan period (see Chapter IV, Section E for a discussion of the terms of debt capital). If the cash flows are negative for two of the five years the plant is projected to have difficulty in obtaining capital.

The projection of the model plant's ability to repay a loan is made whether or not a model is considered viable under the NPV approach and is used in conjunction with the NPV analysis in determining model plant closures. The specific way the results of these two tests are combined are as follows. The NPV/21-year cash flow test described above can have the outcomes V, M or C. The 5-year liquidity test can have the outcomes Negative or Positive. The results for the model, depending on the test outcomes, are defined as:

NPV/21-CF	Liquidity	Model result
V	POS	V
	NEG	M
M	POS	M
	NEG	C
C	POS	C
	NEG	C

Based on these criteria, closure decisions are made for each indirect discharger model at each level. The number of existing facilities associated with the representative models which will cease operations due to wastewater control expenditure requirements are projected utilizing the following methodology.

(1) Based on the NPV/cash flow and liquidity closure criteria described previously, the subcategories and associated models projected to close are identified.

(2) Once identified, the following factors are considered in the determination of the number of actual existing plant closures associated with each projected model plant closure based on the Agency's overall knowledge of each factor.

  (a) The number of existing facilities associated with the model.

  (b) The degree to which existing facilities already have at least some of the treatment controls in-place, and those in-plant controls have not been fully recognized in the cost data.

(c) Historical trends for existing facilities within the subcategory as well as projections of the subcategory's future expectations (helps establish the base case).

(d) The severity by which the model's financial data are reduced. Are the financial data substantially reflective of closure or are the data reflective of a borderline situation?

(e) Review of data utilized (both published and survey data) to develop models. This allows the determination of the probable distribution of the financial profiles of existing facilities when compared to the financial profile of the closing model plant.

(f) Consideration of the reliability of the data utilized in the development of the model plants.

The determination of the production effects resulting from the plant closures is made by applying the projected number of existing facility closures to production quantities associated with the applicable model plant. For directly discharging tanneries the above described analysis of closures was done on a plant by plant basis rather than on a model plant basis, since the agency had more detailed information for each of these tanneries.

f. Employment impact analysis

This analysis was concerned with estimating likely employment losses due to curtailed production or plant closures as a result of pollution controls. If the actual plants which are expected to curtail production or to close could be identified, their employment impacts could be estimated directly. When, however, they cannot be identified, the employment impact analysis must involve the application of estimates of employment changes by model plants. Employment changes in model plants would then be generalized according to the number of actual plants represented by the model plant and aggregated to derive an estimate of total employment effects for the industry. Employment dislocations are noted as appropriate. For direct dischargers, employment effects are estimated on a plant by plant basis.

4. Secondary Production Effects

The secondary production effects are those change in the overall production level of the industry due to changes in the price. This change in output is calculated by estimating the likely price increase resulting from controls, then combining that price increase with an estimate of the elasticity of demand for leather products.

5. Community Impact Analysis

The community impact analysis identified the potential impacts on local community economies when the impacted plant represented a major source of employment and income. This analysis was based on a knowledge of the location of plants, particularly threatened plants, and a general understanding of the economic base of those communities and the relative importance of threatened plants to local economies.

6. Balance of Trade Impact Analysis

Balance of trade impact analysis dealt with those products that have competitive import and export positions. The analysis considers whether or not the estimated price changes would hinder competitive positions of the products with regard to exports or increases in foreign imports. Where important, estimates on the amount of trade that potentially could be impacted and total trade levels are presented.

7. Other Impact Analysis

Other potential impacts may be created by the imposition of pollution control guidelines. These are unique to given industries and require a case-by-case approach. An illustration of such an impact would be a plant that produces a critical intermediate, an input for other industries. The loss of this plant or large price increases could produce serious backward or forward effects on producers or consumers. To the extent additional impacts were important, they are noted.

III. STRUCTURE OF THE INDUSTRY

The Census of Manufactures defines the leather tanning and finishing industry (SIC 3111) as an industry comprised of establishments primarily engaged in tanning, currying, and finishing hides and skins into leather. The Census classifies the leather tanning and finishing industry into three types of establishments. These include:

1. Regular tanneries - the regular tannery purchases raw materials, employs production workers in the plant to tan, curry and finish hides and skins, and sells the finished product. In effect, this type of establishment performs all of the usual manufacturing functions within one organization.
2. Converter - the converter typically performs only the entrepreneurial functions of the manufacturing concern, such as buying raw materials, and arranges processing with outside factories, i.e., contract tanneries for the production of the finished leathers. The actual tanning and finishing of hides and skins is done on contract by the contract tanneries. Thus these establishments do not generate an effluent and as such, will not be required to meet effluent limitations and standards.
3. Contract tanneries - the contract tanner employs production workers in his own establishment to process materials owned by converters and makes products to specification, but does not become involved in the sale of the finished product.

It should be noted, however, that the above classification is not mutually exclusive since some firms in the industry act as both regular tanners and leather converters, or as regular tanners and contract tanners.

Included in the SIC 3111 industry are establishments that tan leather, tan and finish leather, and only finish leather. Those establishments which only finish leather essentially use little water and accordingly generate little, if any, wastewater. As this analysis is concerned with the economic impacts of effluent controls on the industry, the primary emphasis of this report will concern the "wet tanners," those that do generate wastewaters.

Unfortunately, most published data pertains to the entire leather tanning and finishing industry. As such, it is difficult to delineate just the relevant data for the wet tanners. When possible, distinctions between the wet and dry process tanneries will be made; however, where no such distinctions are possible, aggregate data will be used.

A. Industry as a Process

The leather tanning and finishing industry includes processing plants primarily engaged in processing the raw animal hide into usable finished leather. As mentioned previously, the industry is classified into three types of establishments: (1) regular tanneries, (2) converters, and (3) contract tanneries.

Establishments in these classifications provide the link between the raw hides and the finished leather products industry, by converting the raw hides and skins into usable leather. The leather tanning and finishing industry represents one of six four-digit industries in the SIC 31 Tanning; Industrial Leather Goods; and Shoes Industrial Group. A summary of the 1977 Census of Manufactures data for SIC 31 provides a basis for comparing the leather tanning and finishing industry (SIC 3111) with other industries in the group. This is depicted below.

SIC	Description	Number of Establishments	All Employees (1000)	Value Added	Value of Shipments
				----$1,000,000----	
3111	Leather Tanning and Finishing	465*	23.0	535.1	1,456.1
3131	Boot and Shoe Cut Stock & Findings	190	8.5	109.4	270.6
3142	House slippers	78	8.1	108.8	201.2
3143	Men's Footwear, except athletic	213	55.0	871.9	1,734.5
3144	Women's Footwear, except athletic	328	57.6	755.0	1,361.2
3149	Footwear, except rubber N.E.C.	159	24.8	333.7	594.8

As is shown in the summary, the leather tanning and finishing industry is an important industry segment within the group. Exhibit III-1 illustrates many of the interrelationships of the leather tanning and finishing industry with regards to major supplier and customer industries. The domestic leather tanning industry utilized 33 percent of the raw hides and skins produced in the United States in 1979 with the remaining 67 percent being exported.

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* Please note the 465 establishments reported here represent all establishments included in the SIC 3111. Not all of these establishments are leather tanneries. This is discussed in detail in Section B of this chapter.

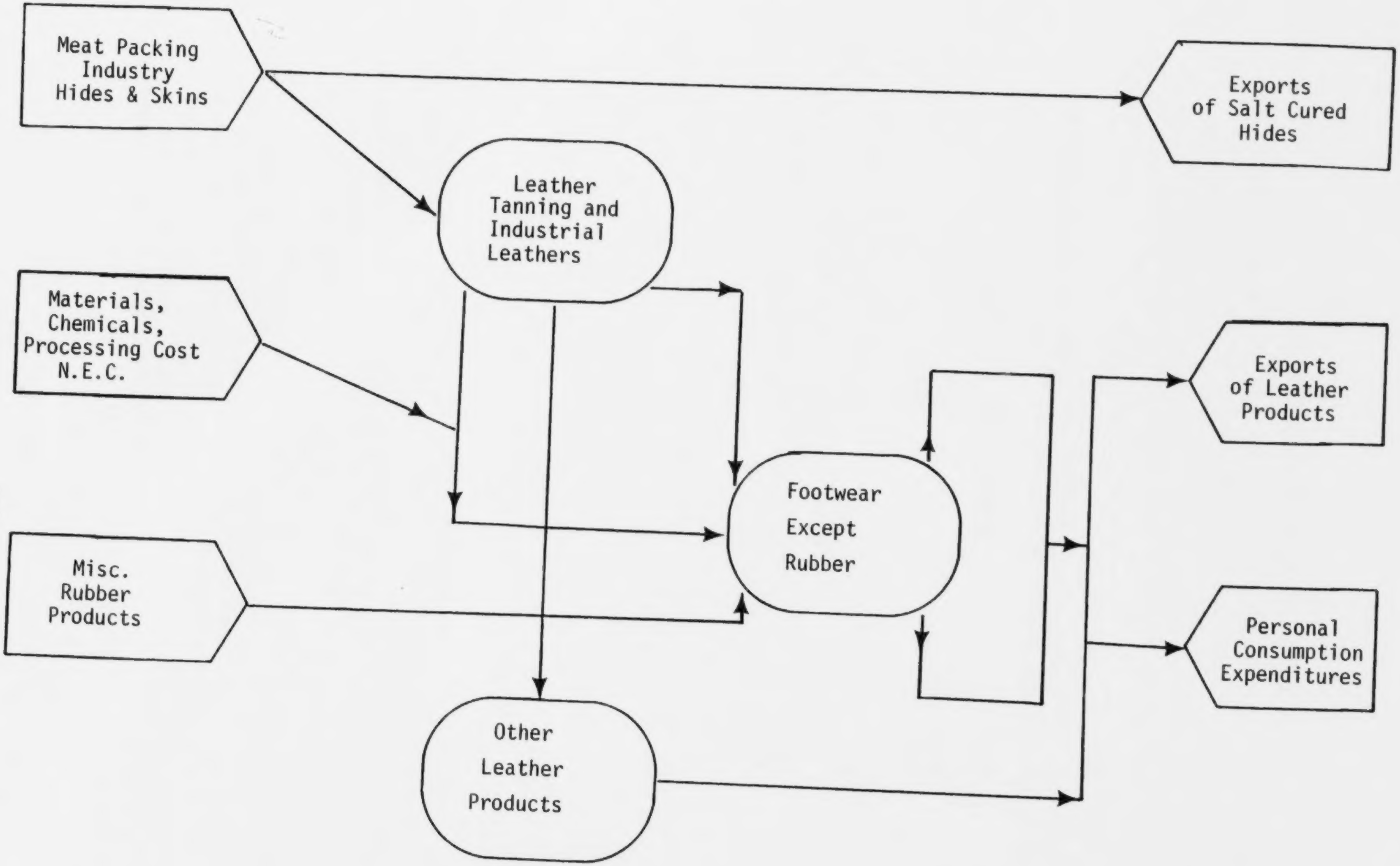
Meat Packing Industry Hides & Skins
Exports of Salt Cured Hides
Leather Tanning and Industrial Leathers
Materials, Chemicals, Processing Cost N.E.C.
Footwear Except Rubber
Exports of Leather Products
Misc. Rubber Products
Personal Consumption Expenditures
Other Leather Products

Exhibit III-1. Leather tanning and finishing industry, sales and expenditures.
Source: U.S. Department of Commerce, Industrial Outlook.

B. Characteristics of the Industry

The leather tanning and finishing industry consists of a wide diversity of types of firms. Firm ownership ranges from family-owned companies and closely held corporations to divisions of relatively large conglomerates. Tanneries vary considerably in size as well as tanning techniques for tanning a variety of hides and skins into several distinct leathers.

Number of Tanneries

The U.S. Department of Commerce has reported the number of establishments in the leather tanning and finishing industry as follows:

Year	Number of Establishments
1963	525
1967	519
1972	517
1973	490
1974	484
1975	441
1977	465

Table III-1 shows the total number of establishments in the leather tanning and finishing industry by classification for 1967, 1972 and 1977. The Census has used the primary plant operation as the delineating classification criteria. If the direct wage and salary payments for one category were less than the payments for the second, the plant was classified according to the category in which the higher amount of wage and salary payments were made. In 1977, 68 percent of the establishments were classified as tanneries, 9 percent as converters, and 23 percent as contract tanneries.

According to the Census of Manufactures, the total number of tanneries (excluding converters which do not actually process hides or skins) with 20 or more employees has declined steadily from 240 in 1967 to 181 in 1977. This general classification more nearly reflects the tanneries addressed in this study as it it believed that many of the small operators would be classified as taxidermists rather than tanners or finishers.

To establish the number of wet tanneries in the industry, an industry survey was conducted in 1976 based on a plant list which was provided by the industry. This survey and more recent updates by EPA resulted in the determination that there are currently (1982) 158 tanneries in existence which generate wastewater. This number reflects a continuation of plant closures that have been occurring over recent years, exclusion of small operations that may be classified as taxidermistic and other establishments that are believed to be finishers (dry processors).

Table III-1. Total number of establishments in the leather tanning and finishing industry by classification

	Total	Tanneries	Converters	Contract Tanneries
1967				
No. of establishments	519	314	70	135
With 1 - 19 employees	261	163	52	46
With 20 - 99 employees	171	91	13	67
With 100 employees or more	87	60	5	22
1972				
No. of establishments	517	301	76	140
With 1 - 19 employees	294	154	64	76
With 20 - 99 employees	148	89	8	51
With 100 employees or more	75	58	4	13
1977				
No. of establishments	465	315	43	107
With 1 - 19 employees	274	191	33	50
With 20 - 99 employees	129	76	8	45
With 100 employees or more	62	48	2	12

Source: U.S. Department of Commerce, Census of Manufactures, 1977 and earlier.

Size of Tanneries

Based on the the number of employees, an indication of plant size is available from the Census of Manufactures (Table III-1). Overall, the decline in plant numbers is reflected more severely in plants with 100 or more employees (excluding converters). The larger sized plants experienced a 26 percent decline from 1967 to 1977 compared with a 23 percent decline in plant numbers with 20 to 99 employees.

	Number of tanneries with 20 or more employees		
	Number of employees		
	20-99	> 100	Total
1967	158	82	240
1972	140	71	211
1977	121	60	181

An alternative size classification was developed from the EPA survey data and recent updates for the number of wet tanneries. This was based on the number of cattlehide equivalents processed daily. 1/ This is shown below.

Daily Capacity (cattlehide equivalents) 1/	Number of Wet Tanneries	Percent
Less than 300	39	25
300 - 699	38	24
700 - 1,199	33	21
1,200 - 1,999	27	17
2,000 or more	21	13
	158	100

The wet tanners identified by the industry survey are somewhat more evenly distributed according to size than are the establishments of the Census data. However, as was the case for the Census data, the smaller size categories do represent a larger portion of the tanneries than the larger categories.

Types of Major Products

Six major categories of animal skins are used today. They are as follows: cattlehides, kipskins, and calfskins; sheep and lamb skins; goat and kidskins; pigskins; horsehides; and deer and elk skins.

The products of the industry can be identified in traditional terms based upon primary raw materials employed and end use.

CATTLEHIDES:

CATTLE SIDE LEATHER. This is the principal product of the industry which accounts for approximately 67% of total industry sales. Its end

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1/ One cattlehide equivalent equals 40 square feet of leather.

use includes shoe uppers, linings, garments, gloves, sporting goods, handbags, small leather goods, and waist belts. Side leather is primarily chrome tanned.

CATTLE SIDE SPLIT LEATHER. Cattle side split leather is a by-product of hides which is not processed in full thickness. It is primarily used for shoe uppers, linings, insoles, work gloves, small leather goods, handbags, and protective industrial clothing. It is chrome tanned and is processed by side leather tanners or sold to "split tanners" for finishing into specialized products.

SOLE LEATHER. Sole leather is almost entirely vegetable tanned. Its major use is for shoe soles. Secondary uses include welting, counters, box toes, and waist belts.

CATTLE SIDE PATENT LEATHER. This product is a sub-class of chrome tanned cattle sides and is finished with special compounds (polyurethanes) for glossy surface.

KIP SIDE LEATHER. This leather is tanned from kips, which are small hides, intermediate between calfskins and cattlehides. It is used almost entirely for shoe uppers.

UPHOLSTERY LEATHER. This product is primarily vegetable tanned, with some chrome retannage. Its end use includes automotive and furniture upholstery.

HARNESS AND SADDLERY LEATHER. This is a composite group of the same plants which possess different characteristics useful for various parts of equine equipage or related uses (collar, harness, skirting, latigo, bridle, etc.). It is also used for holsters, gun cases, etc.

SPORTING GOODS LEATHER. Combination tannages of chrome, vegetable, alum, and glutaraldehyde are used to produce footballs, baseballs, baseball gloves and laces.

BAG, CASE AND STRAP LEATHER. This is a trade description for a specialized group of leathers which are vegetable, chrome and combination tanned. End uses include luggage briefcases, small leather goods, decorative items, equipment cases, straps, and heavy bookbinding.

MECHANICAL LEATHER. Vegetable, chrome and impregnated leather are produced for industrial uses including belting, gaskets, washers, and seals for equipment.

CALFSKINS. Chrome tanned leather from skins of immature cattle are used for shoe uppers and handbags. The volume produced is in sharp decline due to shrinkage of raw material supply.

SHEEP AND LAMB SKINS:

This is the second largest raw material category. Chrome, alum, oil and combination tannages are used to produce garments, gloves, shoe uppers and linings handbags and wallets, bookbinding and chamois.

GOAT AND KID LEATHER SKINS:

Chrome tanned leather in a smooth or suede finish is used for shoe uppers and linings.

PIGSKIN:

Vegetable or chrome tanned leather is used to produce shoe uppers, gloves, garments, and small-leather goods.

HORSE HIDES:

Chrome and vegetable processed leather is used in the production of shoe uppers, garments, and baseballs. Cordovan is included in this group.

DEER AND ELK HIDES:

Chrome and vegetable tanned leather is used to produce gloves, garments, and to a minor degree, shoe uppers (buckskin).

MISCELLANEOUS AND EXOTIC LEATHERS

Aggregate volume of these products is minor and the number of producers in the U.S. is less than 10. Products manufactured include kangaroo for athletic shoe uppers, reptile for shoe uppers, belts, and small leather goods, and peccary and carpincho for gloves.

In summary, cattlehides are the dominant raw material of the industry with the major products of cattle side leather, sole leather, upholstery, garment and bag, and case and strap leathers. Sheep and lamb skins are the second and much smaller raw material base yielding mainly garment and glove leather, lining and shoe stock, chamois and leather for small leather goods.

Value of Shipments

Value of shipments and other receipts of the leather tanning and finishing industry in 1981 totaled $2,181 million compared with $1,456 million in 1977 (as shown in Table III-2). This included shipments of tanned and finished leather (primary products) valued at $2,112 million, and miscellaneous receipts (mainly contract work and resales) of $69 million. Historically the value of shipments has fluctuated from year to year; however, the overall average annual increase in current dollars has been 5.3 percent since 1960.

Table III-2. The leather tanning and finishing industry, value of shipments, 1960 to 1981

Year	Value of shipments	Percentage change
	(mil. $)	(%)
1960	790.7	--
1961	761.1	-3.7
1962	765.9	-0.6
1963	758.4	-1.0
1964	783.6	3.3
1965	856.7	9.3
1966	940.5	9.8
1967	870.1	-7.5
1968	877.9	0.9
1969	853.9	-2.7
1970	794.4	-7.0
1971	838.3	5.5
1972	1,059.5	26.4
1973	1,082.0	2.1
1974	980.0	-9.4
1975	1,105.0	12.8
1976	1,326.0	20.0
1977	1,456.1	9.8
1978	1,579.7	8.5
1979	1,803.0	14.1
1980	1,900.0	5.4
1981	2,181.2	14.8

Source: Department of Commerce, Bureau of the Census.

Shipments of tanned and finished leather (primary products) in 1972 and 1977 represented 99 percent (specialization ratio) of the industry's total product shipment. The industry specialization ratio in 1967 was 98 percent. Secondary products shipped by the industry in 1972 consisted mainly of boot and shoe cut stock and linings.

Shipments of tanned and finished leather from establishments classified in industry SIC 3111 in 1977 represented 99 percent (coverage ratio) of total leather shipments valued at $1,380.1 million shipped by all industries. In 1967, the coverage ratio was also 99 percent. Thus for all practical purposes, it can be concluded that all establishments tanning and finishing leather are classified in industry SIC 3111.

Location of Tanneries

Leather tanning and finishing establishments tend to be concentrated in the Northeastern region of the country. As shown in Table III-3, 62 percent of the total number of establishments were located in that area in 1972. Massachusetts ranked first, in total number of plants; New York second; and New Jersey third, with 25, 19 and 8 percent respectively.

The second area of concentration is the East North Central region with Wisconsin reporting 22 plants or 4.3 percent of the total. Other states of importance in this region include Ohio, Illinois, and Michigan. The remaining plants are scattered widely throughout the United States.

The 1977 Census data failed to identify the location of a significant number of tanneries (52 total and 17 with over 20 employees). As a result percentages of tanneries by area for 1977 are no longer meaningful.

Historically, tanneries were established where there was an adequate supply of hides, water and tanning materials (i.e., tree bark). This began in New England and the Mid-Atlantic states and followed the cattle herds west, though with a long time delay. As indicated above, tanneries are still located in New England and Chicago as well as in the dairy country of Wisconsin. However, with the recent spatial dispersion of slaughter facilities away from the traditional centers such as Chicago and Kansas City, the few new tanneries have followed the same trend and located near the supply of hides.

The locations of all the wet tanneries are difficult to pinpoint as adequate data are not presently available. However, based on the survey responses, 54 percent were located in the New England states; 10 percent were located in the Southern states; 25 percent were located in the Midwest; and the remaining 11 percent were located in the Western and Southwestern states.

Table III-3. Location of leather tanning and Finishing establishments by primary state and region, 1967, 1972, 1977

	1967				1972				1977			
	Total industry		Establishments with 20 or more employees		Total industry		Establishments with 20 or more employees		Total industry		Establishments with 20 or more employees	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Northeast Region	359	69.2	161	62.4	324	62.7	132	59.2	273	58.7	108	56.5
New England Division	183	35.3	93	36.0	163	31.5	78	35.0	138	29.6	61	31.9
Maine	16	3.1	14	5.4	15	2.9	10	4.5	13	2.9	8	4.2
New Hampshire	18	3.5	15	5.8	19	3.7	14	6.3	14	3.0	10	5.2
Vermont	1	0.2	1	0.4	1	0.2	1	0.4	1	.2	1	.5
Massachusetts	146	28.1	62	24.0	128	24.7	53	23.8	110	23.8	42	22.0
Other	2	0.4	1	0.4	--	--	--	--	--	--	--	--
Middle Atlantic Division	176	33.9	68	26.4	161	31.1	54	24.2	135	29.0	47	24.6
New York	108	20.8	30	11.6	98	19.0	26	11.7	85	18.2	28	14.7
New Jersey	48	9.2	25	9.7	43	8.3	15	6.7	31	6.7	7	3.7
Pennsylvania	20	3.9	13	5.1	20	3.9	13	5.8	19	4.1	12	6.2
North Central Region	87	16.8	58	22.5	84	16.2	48	21.5	67	14.4	31	16.2
East North Central Division	74	14.2	51	19.8	62	12.0	39	17.5	53	11.4	23	12.0
Ohio	12	2.3	7	2.7	8	1.5	4	1.8	7	1.5	5	2.6
Illinois	19	3.6	12	4.7	19	3.7	10	4.5	14	3.0	5	2.6
Michigan	10	1.9	5	1.9	8	1.5	4	1.8	8	1.7	3	1.6
Wisconsin	30	5.8	24	9.3	22	4.3	19	8.5	24	5.2	10	5.2
Other	3	0.6	3	1.2	5	1.0	2	0.9	NA	NA	NA	NA
West North Central Division	13	2.6	7	2.7	22	4.2	9	4.0	14	3.0	8	4.2
Minnesota	2	0.4	1	0.4	4	0.8	2	0.9	5	1.0	3	1.6
Missouri	6	1.2	5	1.9	NA	NA	NA	NA	3	.7	2	1.0
Iowa	NA	NA	NA	NA	6	1.1	4	1.8	6	1.3	3	1.6
Other	5	1.0	1	0.4	12	2.3	3	1.3	NA	NA	NA	NA
South Region	47	9.0	30	11.6	59	11.4	27	12.1	37	8.0	22	11.6
South Atlantic Division	26	5.0	18	7.0	27	5.2	14	6.3	14	3.0	9	4.7
Delaware	6	1.1	6	2.3	2	0.4	2	0.9	NA	--	NA	NA
Maryland	2	0.4	1	0.4	1	0.2	1	0.4	2	.4	1	.6
Virginia	4	0.8	4	1.6	5	1.0	3	1.3	2	.4	2	1.0
West Virginia	4	0.8	4	1.6	4	0.8	4	1.8	2	.4	1	.5
North Carolina	2	0.4	2	0.7	5	1.0	2	0.9	3	.7	2	1.0
Georgia	2	0.4	1	0.4	2	0.4	1	0.4	3	.7	1	.8
Other	6	1.1	0	--	7	1.4	1	0.4	2	.4	2	1.0
East South Central Division	12	2.3	10	3.9	12	2.3	10	4.5	13	2.8	9	4.7
Kentucky	3	0.6	3	1.2	3	0.6	3	1.3	2	.4	2	1.1
Tennessee	9	1.7	7	2.7	8	1.5	7	3.2	11	2.4	7	3.6
Other	--	--	--	--	1	0.2	NA	--	NA	NA	NA	NA
West South Central Division	9	1.7	2	0.8	20	3.9	3	1.3	10	2.2	2	1.1
Texas	7	1.3	2	0.8	15	2.9	3	1.3	10	2.2	2	1.1
Other	2	0.4	0	--	5	1.0	NA	--	--	--	--	--
West Region	26	5.0	9	3.5	50	9.7	16	7.2	36	7.7	13	6.8
Pacific Division	26	5.0	9	3.5	42	8.1	14	6.3	36	7.7	13	6.8
California	15	2.9	8	3.1	33	6.4	13	5.8	36	7.7	13	6.8
Other	11	2.1	1	0.4	9	1.7	1	0.5	NA	7.7	13	6.8
Unaccounted for (1977 Census)									52	11.2	17	8.9
TOTAL	519	100.0	258	100.0	517	100.0	223	100.0	465	100.0	191	100.0

NA - Not Available

Source: U.S. Department of Commerce, Census of Manufactures, 1967 through 1977.

If these percentages are extrapolated for the current listing of wet tanneries, the locational breakdown appears as follows:

Area	Number of Wet Tanneries
New England	86
South	16
Midwest	39
West and Southwest	17
Total	158

Age of Plants and Level of Technology

The leather tanning and finishing industry can be described as having basically old plants in terms of actual brick and mortar with slightly over 70 percent of the plants 50 years of age or older. From the membership records of the Tanners' Council, the age of tanning and/or finishing leather plants, excluding converter, is as follows:

	Percent of Members
Less than 10 years	1
10-15 years	1
15-20 years	3
20-30 years	5
30-50 years	19
Over 50 years	71
Total	100

Although the majority of industry units are in old buildings, a substantial number of plants have been rebuilt, modernized and re-equipped at a cumulative cost approaching the capital investment required for new plants.

In a previous report developed for EPA, 1/ tanneries were categorized with respect to their level of technology. The technological levels considered were older, prevalent and new, i.e., 1950, 1963 and 1967 vintage respectively. Using this classification scheme, 20 percent of the tanneries were placed in the older category and the remainder categorized in the prevalent or new category. Thus while the tanneries themselves may be older, it is obvious that from a technological standpoint, they are relatively modern. Finally, it should be noted that while a majority of the tanneries have technological levels of 1963 or later, the tanning technique has not changed significantly; instead the processes are being performed utilizing newer equipment.

1/ Urban Systems and Engineering, "The Leather Industry--A Study of the Impact of Pollution Control Costs," December, 1971.

C. Importance of Integrated Capacities

The industry is not characterized by any appreciable integration either back to the raw material supply or forward to finished or fabricated leather products. There is, in fact, less integration today than several years ago when two major packers owned tanning facilities and four leading shoe manufacturers operated tanneries. In 1973, the only remaining firm integrated with the raw material source was A. C. Lawrence Leather Company (Swift) and during 1974 it was sold by Swift to its employees. Armour and Company, which had operated the Armour Leather Company for two generations, had earlier sold its leather subsidiary and liquidated all leather operations.

With regard to forward integration, the Brown group (Brown Shoe) still operates a tannery as does Genesco, both of which manufacture shoes. However, other shoe manufacturers such as Endicott, Johnson, Wolverine, and Interco have sold or liquidated all tanning enterprises. A few tanneries are associated with the leather garment industry (e.g., Sawyer Tanning Company); however, these types of arrangements are not common. It is estimated that the sales volume of tanning or finishing establishments integrated with raw material producers is very small, less than five percent of gross annual volume. Leather tanning facilities owned or operated by manufacturing companies account for an equally small percentage of leather sales or value.

D. Level of Diversification

The Census of Manufactures shows the leather tanning and finishing industry with a very high specialization ration of 99 percent for 1972. This indicates that 99 percent of sales are in the primary SIC code. The typical production unit of the industry is not diversified for two main reasons. First, tanning equipment and processes are specialized and non-interchangeable in terms of raw materials or end product. For example, equipment suitable for tanning and finishing pigskins cannot be used for cattle hides. Hence, most plants have confined production to a very limited range of products.

Second, shoe manufacturing has been and still is the principal consuming industry. In 1962, shoes accounted for 83 percent of all leather used. By 1972 this ratio had declined to 74 percent, and tanneries were seeking to diversify output. Cattle side leather plants entered the garment leather market and sought outlets in waist belts, handbags or small leather goods. However, this trend does not reflect diversification of basic product line. It indicates rather, an effort to adapt available plants and equipment to moderately different needs of end uses other than shoes.

A further observation is pertinent. Tanning machinery and equipment cannot be adapted for any purpose other than treating hides and skins. It is fixed capital which must be written off at scrap value in the absence of demand for used machines.

E. Employment Characteristics

Employment

Total employment within the leather tanning and finishing industry has decreased by over 37 percent since 1965 from 32,000 employees in 1965 to 21,300 employees in 1981 (Table III-4). Of the total employees in 1981, production workers were approximately 84 percent or about 17,100 individuals. Since 1965, the number of production workers in the industry has declined by nearly 37 percent from 27,900 in 1965 to 17,100 in 1981.

The leather tanning industry employs unskilled, semi-skilled and skilled labor dependent upon the requirement of the task being performed. Tanneries can be either union or nonunion shops, with the number of tanneries in each category being about equal.

Production workers average approximately 1900 hours per year which represents 230 to 250 employed days per year. With respect to the productivity of production workers, Table III-4 depicts the average number of hours required to produce one cattlehide equivalent. As shown in the table, this productivity measure has varied from year to year but has remained reasonably close to 1.7 hours per hide since 1965.

Level of Wages

In 1977, the total industry's payroll amounted to $220.0 million. The total wages paid to production workers for the same year totaled $192.2 million or about 78 percent of the industry's total payroll, up from 74 percent in 1972.

Annual wages per production worker averaged $9,806 in 1977 which represented an increase of 97 percent since 1965. During this same period, the average hourly rate increased by 118 percent from $2.44 per hour in 1965 to $5.33 per hour in 1977. The rate increased to $7.29 per hour in 1981.

F. Ownership Type and Size

As indicated above, the leather tanning and finishing industry consists of a wide diversity of types and sizes of firms. Firm ownership ranges from family-owned companies and closely held corporations to divisions of large conglomerates. However, the majority of the tanneries would fall into the family-owned or closely held corporation group. This is attributable to the fact that most tanneries are relatively small and were established years ago by either a family or a small group of individuals who have remained in control of the operation.

Table III-4. The leather tanning and finishing industry, employment characteristics

Year	All employees		Production workers					
	Number	Payroll	Number	Wages	Annual hours/worker	Annual wages/worker	Ave. hourly rate	Ave. hours per equiv. hide
	(1000)	(mil. $)	(1000)	(mil. $)	(hours)	(dollars)	(dollars)	(hours)
1965	32.0	180.0	27.9	139.0	2,039	4,982	2.44	1.74
1966	32.7	189.2	28.2	144.4	2,039	5,121	2.51	1.78
1967	30.7	186.4	26.4	142.5	2,000	5,398	2.70	1.71
1968	31.1	196.0	26.7	151.2	1,985	5,663	2.85	1.66
1969	28.8	188.1	24.4	142.8	1,943	5,852	3.01	1.67
1970	24.1	171.5	20.4	129.8	1,980	6,363	3.21	1.56
1971	24.5	183.9	20.7	137.6	1,976	6,647	3.36	1.62
1972	25.7	200.0	22.1	151.3	1,896	6,846	3.61	1.70
1973	23.4	186.5	19.8	138.2	1,909	6,980	3.66	1.79
1974	21.0	194.3	18.0	141.4	1,934	7,726	3.99	1.74
1975	22.0	220.0	19.0	165.5	1,979	8,619	4.36	1.73
1976	23.0	254.8	19.6	181.4	1,944	9,350	4.81	1.62
1977	23.0	243.9	19.4	192.2	1,948	9,806	5.33	1.76
1978	23.0	NA	19.7	NA	NA	NA	5.62	NA
1979	21.2	NA	17.9	NA	NA	NA	5.92	NA
1980	19.4	NA	16.3	NA	NA	NA	6.71	NA
1981	20.3	NA	17.1	NA	NA	NA	7.29	NA

Source: U.S. Department of Commerce, Bureau of the Census (U.S. Industrial Outlook for 1978 to 1981).

G. Industry Segments

The leather tanning and finishing industry has traditionally been segmented by the industry by the type of leather manufactured such as cattlehide leathers, sheep and lamb skins, goat skins, etc. Most of the industry production data are given in these terms. However, categorization of the industry by manufacturing processes and raw materials is more appropriate for evaluating the imposition of pretreatment control on the industry since a major factor affecting the waste production in the leather industry is the type of manufacturing process used to convert the various types of animal skins to finished leathers, the type of skins also affects water use, and hence treatment costs.

The following material discusses industry segments using two taxonomies: (1) conventional industry segments, and (2) categorization of plants by manufacturing process and raw materials.

Conventional Industry Segments

Cattlehide leathers are the predominant type of leather processed, and accounted for 78 percent of the value of shipments in 1977. Of this amount, cattlehide and kip side leathers were the predominant segment accounting for 73 percent of the total value of production. This is a slight increase in value over 1972 (Table III-5). In 1972, 1,132 million square feet of cattle side leathers were processed compared with 1,055 million square feet in 1977.

Sheep and lamb leather was the second most important category in 1977 and accounted for 6.3 percent of the total value of production. However, volume dropped in this category from 111 million square feet in 1972 to 79 million in 1977.

Categorization of Plants

For the purposes of establishing effluent limitation guidelines and standards of performance, the leather tanning and finishing industry has been divided into nine major subcategories. These subcategories have been developed by the agency principally by similarities in process and raw materials. The subcategories are:

1. Hair pulp, chrome tan, retan-wet finish--a tannery that primarily processes raw or cured cattle or cattle-like hides into finished leather, chemically dissolves the hide hair, and uses chrome tanning.

2. Hair save, chrome tan, retan-wet finish--a tannery that primarily processes raw or cured cattle or cattle-like hides into finished leather, with at least a portion of the hide hair loosened and removed as a solid and then discarded or saved, and uses chrome tanning.

Table III-5. Quantity and value of production by conventional industry segment, 1972 and 1977

Industry segment	1977 Quantity (million sq ft)	1977 Value ($ million)	1977 Percent of production (value basis)	1972 Quantity (million sq ft)	1972 Value ($ million)	1972 Percent of production (value basis)
Cattlehide and kip side leather	1,055	1,005	72.8	1,132	684	66.7
Sole leather	111	130	9.4	99	64	6.2
Bag case & strap	NA	29	2.1	32	25	2.4
Upholstery	70	100	7.2	38	39	3.8
Upper leather (sides)	472	487	35.3	556	352	34.3
Patent leather (sides)	11	11	0.8	85	52	5.1
Garment leather (sides)	36	31	2.2	140	85	8.3
Other grains	84	74	5.4			
Offal (heads shoulders bellies) sale, waist belt and welting	44	26	1.9	37	18	1.8
Finished splits	171	86	6.2	136	44	4.3
Finished cattlehide NSK	35	34	2.5	8	5	.5
Finished calf and whole kip leather	NA	26	1.4	35	35	3.4
Sheep and lamb leather	79	88	6.3	111	55	5.4
Other finished leathers 1/	59	36	2.6	108	48	4.7
Rough & crust	x	48	3.5	NA	52	5.1
Other		177	12.8		153	14.9
Total	NA	1,380	100.0	NA	1,026	100.0

1/ Includes cabretta, horse, colt, mule, ass and pony leathers

Source: U.S. Department of Commerce, Census of Manufactures.

3. Hair save nonchrome tan, retan-wet finish--a tannery that primarily processes raw or cured cattle or cattle-like hides into finished leather using less than 20 percent (by hide weight) chrome tanning; includes vegetable, alum, syntans, oils, and other methods and their combinations.

4. Retan-wet finish sides--a tannery that primarily processes previously tanned hides and/or skins into finished leather, the major wet process consisting of retanning, coloring, and fat-liquoring.

5. No Beamhouse--a tannery that primarily processes hides and/or skins, with the hair previously removed, into finished leather using either chrome or nonchrome tanning methods, primarily includes pickled sheepskins and cattlehides and pigskins.

6. Through the blue--a tannery that primarily processes raw or cured cattle or cattle-like hides through the blue-tanned state only, with no retanning or finishing operations, and uses chrome tanning.

7. Shearling--a tannery that processes raw or cured sheep or sheep-like skins, with the wool or hair retained on the hide, into finished leather using chrome or nonchrome tanning; or, a wool pullery--a plant that processes hair-on raw or cured sheep or sheep-like skins by first removing the wool and then pickling the skin for use by a sheepskin tannery.

8. Pigskins--a tannery that processes raw or cured pigskins into finished leather using chrome tanning.

9. Retan-wet finish (splits)--a tannery that primarily processes previously tanned splits into finished leather, the major wet process consisting of retanning, coloring, and fat liquoring.

IV. FINANCIAL CHARACTERIZATION OF THE INDUSTRY

Because the industry primarily consists of family-owned businesses or relatively small privately-held corporations, published information regarding the financial position of the leather tanning and finishing industry is not readily available. Limited data are available from the Internal Revenue Service, but these data are generally 3-4 years old when published and represent the aggregated leather and leather products industry. More recent data for leather tanners are available from Robert Morris Associates' Statement Studies, representing financial information from about 40 different statements.

Information used to develop this chapter on the financial profile of the industry draws on the above sources where applicable. Additional information was obtained from the U.S. Department of Agriculture, the U.S. Department of Commerce, the responses to the Agency's survey, and from discussions with persons knowledgeable about the industry.

A. General Financial Situation

The leather tanning and finishing industry in the United States has experienced a substantial decline in volume of hides processed over the past two decades. In addition the industry has experienced a somewhat volatile financial situation in recent years. The industry reached a low in 1973 and 1974 but beginning in late 1974 and continuing through 1976, the industry experienced a much brighter financial situation. However, beginning in late 1977 the industry's financial situation again showed signs of deterioration. In 1981, output increased for the first time since 1976, but from mid-1981, output decreased at a rapid rate.

The volatility of revenues varies from firm to firm and reflects differing tannery operations and leather products. The causes of this volatility are primarily the changes in the volume of leather sold, and the competition from foreign countries for both raw hides and for the leather and leather products markets. Leather production has been declining since 1965, decreasing from 32.7 million cattlehide equivalents in 1965 to 19.5 million in 1981 (Table IV-1).

The growth in the industry's value of shipment may be attributed primarily to a substantial increase in the cost of the leather tanning and finishing industry's major expense, raw hides and skins in the late 1970s. The large decline in slaughter and high foreign demand forced hide prices up.

Table IV-1. The leather tanning and finishing industry, production and value of shipments, imports, and exports in current and real dollars, 1965-1981

Year	Total industry production 1/	Value of industry shipments 2/		Value of leather imports 2/		Value of leather exports 2/	
	1,000 equiv. hides	Current	Real 3/	Current	Real	Current	Real
		---------------------------	----------------	-million dollars-	----------------	----------------	----------------
1965	32,697	857	1,153	67	90	39	52
1966	32,252	940	1,226	75	98	42	55
1967	30,861	870	1,101	68	86	42	53
1968	31,884	878	1,063	81	98	45	54
1969	28,388	854	985	86	99	42	48
1970	25,941	794	869	87	95	37	40
1971	25,267	838	873	83	86	43	45
1972	24,661	1,060	1,060	139	139	67	67
1973	21,062	1,082	1,021	127	120	83	78
1974	19,998	1,076	843	125	107	102	88
1975	21,894	1,092	858	88	69	142	112
1976	23,526	1,326	991	181	135	139	104
1977	21,528	1,456	1,051	156	110	150	106
1978	20,199	1,580	1,039	222	146	195	128
1979	18,170	1,803	1,397	283	184	251	146
1980	17,600	1,900	855	217	97	271	122
1981	19,500	2,181	940	323	139	279	120

Sources: 1/ Tanners Council of America, Inc., Membership Bulletin Leather Industry Statistics, 1979 Edition.

2/ U.S. Department of Commerce, Annual Survey of Manufacturers and U.S. Industrial Outlook.

3/ Real dollars based on Implicit GNP Deflator (1972=100).

Over the past decade consumer acceptance of synthetics as a substitute for leather--particularly for men's dress shoes, women's and children's shoes, and handbags--has become widespread. As a result, a significant portion of the market previously held by leather has been lost to synthetic products. During the past few years, however, consumers have developed a renewed appreciation for natural leather products. Accordingly, leather increased its share of several product markets. This increase, however, has not been totally absorbed by domestic tanners; much has been met by imported leather and leather products.

The value of leather imports has increased at an average annual rate of 14.3 percent since 1965. Imports climbed to a value of close to \$140 million in 1972 and then declined for three successive years reaching a low of \$88 million in 1975. In 1977 the exceeded \$200 million and in 1981 they reached a record high of \$323 million. The major effect of imports on the leather industry is from shoe importing which is discussed below.

The economic analysis contained in this report is based on historical information and our projections of this information to reflect conditions at the time of compliance with the regulations being issued. The information presented in this chapter shows that the leather tanning industry is experiencing a general decline for a variety of reasons. The Agency believes that this general decline will continue for the foreseeable future without any significant changes in the underlying factors causing the decline. There may, however, be temporary reversals of the decline or a faster decline due to conditions in the overall economy. The historical data used covers business cycles and is the basis for projections on future cycles. The financial characteristics presented in this chapter are the basis for projections.

B. Cost Structure of the Industry

1. Revenues

In 1979, the leather tanning and finishing industry had estimated shipments valued at \$1,803 million (Exhibit IV-1), an increase of about 14 percent over the value of shipments for 1978. However it should be noted that value added actually decreased from \$564 million to \$541 million. The substantially higher value of shipments was due primarily to higher hide prices with resulting higher leather prices. Historically, the industry's values of shipments have fluctuated from year to year. However, since 1970, shipments have increased during every year except 1974, when they decreased 0.5 percent over the value in 1973.

In addition to experiencing a general slump in production prior to 1975-76, the real value of the industry's production has declined noticeably. From 1966, when the real value of shipments 1/ was \$1,226 million (Exhibit IV-1), real revenues have fallen to as low as \$843 million in 1974, a 31

1/ $\frac{\text{Value of Industry Shipment}_i}{\text{Implicit GNP Deflator}_i}$, where i = year (1972 = 100.0)

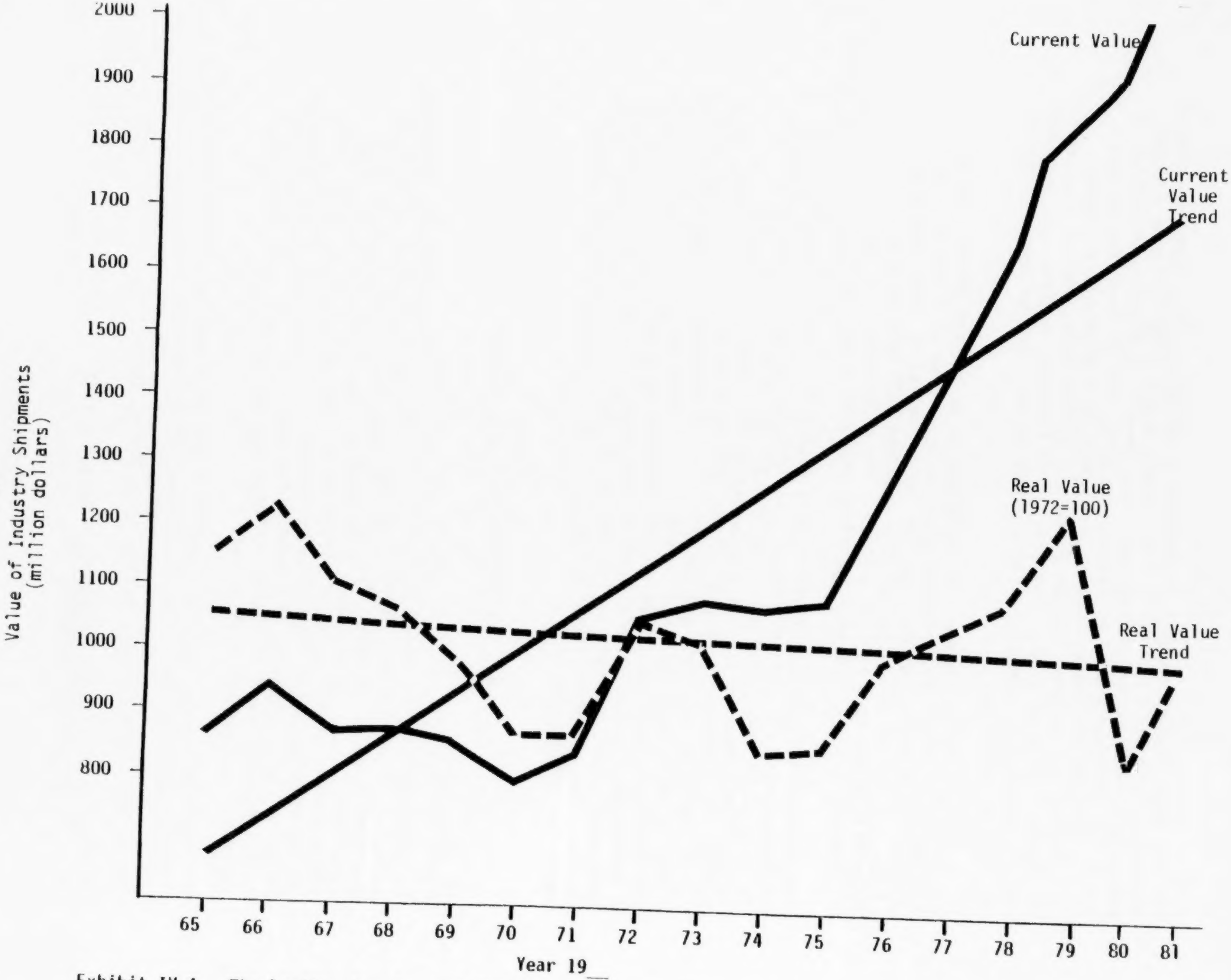

Exhibit IV-1. The leather tanning and finishing industry, value of industry shipments, current

percent decrease over eight years. This decline in real revenue mirrors a decline in production, and is attributable to a variety of factors, especially foreign competition.

The 1979 value of shipments for the industry was based on information provided by 360 establishments and the Bureau of the Census. The average tannery's value of shipment was $6.4 million, and its average annual production was 50,000 cattle-hide equivalents (Table IV-2). This compares to an average value of shipments of $4.2 million in 1978, $2.5 million in 1975, $2.0 million in 1972, and $1.7 million in 1967. Average production per establishment was 53,000 cattlehide equivalents in 1978, 50,000 in 1975, 48,000 in 1972, and 59,000 in 1967.

2. Variable Costs

Leather tanning industry variable costs represent approximately 80 percent of total sales. These costs include expenditures for raw hides and/or skins, labor, tanning materials, and miscellaneous other direct costs. According to a survey of the industry in 1976, hides and skins comprise 37.2 percent of the sales dollar, tanning materials, 14.3 percent, labor, 15.1 percent, and miscellaneous expenditures, 12.4 percent. These sum to 79 percent of the sales dollar.

The only time series depicting the composition of the sales dollar is available from the Department of Commerce and is limited in its disaggregation. These data are shown in Table IV-3. Historically, raw materials, primarily hides, have represented about 60 percent of the sales dollar. Since 1976-77, prices of new materials have all increased, particularly the prices paid for hides. Therefore this historical data is not representative of current sales dollar composition, which is presented in Chapter V, Prices.

3. Fixed Costs

Fixed costs are defined as those which do not vary with the level or quantity of production. These include:

- sales expenses--general and administrative,
- plant and labor overhead,
- taxes and insurance, and
- maintenance and repair.

Data were not available to discuss each of the above costs separately; therefore, fixed costs were grouped. Fixed costs vary from firm to firm; however, they usually represent 10 to 15 percent of sales.

Interest is considered a fixed cost although it is somewhat influenced by total sales. As shown in Table IV-4, interest costs vary by size of operations. Although there are exceptions, larger tanneries generally allocate a greater portion of their sales dollar to interest.

Table IV-2. The leather tanning and finishing industry, total and per establishment data, selected years 1963 to 1979.

Item	Units	1963	1967	1972	1975	1976	1977	1978	1979
		Year							
Establishments	No.	525	519	517	441	430	416	380	360
VALUE OF SHIPMENTS									
Industry	$1,000	758,000	850,000	1,060,000	1,092,000	1,326,000	1,489,000	1,580,000	2,313,000
Per establishment	$1,000	1,440	1,680	2,050	2,476	3,884	3,579	4,157	6,425
VALUE ADDED									
Industry	$1,000	273,000	319,000	368,000	443,500	521,000	549,000	564,000	541,000
Per establishment	$1,000	520	615	710	1,006	1,212	1,260	1,482	1,502
PRODUCTION									
Industry	1,000 equiv. hides	31,325	30,861	24,661	21,894	23,526	21,528	20,199	18,170
Per establishment	1,000 equiv. hides	60	59	48	50	55	52	53	50
EMPLOYEES									
Industry	Number	31,400	30,700	25,700	22,500	23,000	23,400	23,000	20,100
Per establishment	Number	60	59	50	51	53	56	60	56

Source: U.S. Department of Commerce.

Table IV-3. The leather tanning & finishing industry, distribution of the sales dollar

	TOTAL SALES		COST OF MATERIALS		PAYROLL		OTHER COSTS, TAXES & PROFITS	
	Million Dollars	Percent	Million Dollars	Percent	Million Dollars	Percent	Million Dollars	Percent
1965	856.7	100.0	535.6	62.5	180.0	21.0	141.1	16.5
1966	940.5	100.0	614.1	65.3	189.2	20.1	137.2	14.6
1967	870.1	100.0	547.0	62.9	186.4	21.4	136.7	15.7
1968	177.9	100.0	524.5	59.8	196.0	22.3	157.4	17.9
1969	853.9	100.0	514.9	60.3	188.1	22.0	150.9	17.7
1970	794.4	100.0	471.4	59.3	171.5	21.6	151.5	19.1
1971	838.3	100.0	498.5	59.5	183.9	21.9	155.9	18.6
1972	1059.5	100.0	708.0	66.8	200.0	18.9	151.5	14.3
1973	1081.5	100.0	744.3	68.8	186.5	17.3	150.7	13.9
1974	1075.5	100.0	680.4	63.3	194.3	18.1	200.8	18.7
1975	1091.8	100.0	643.3	58.9	220.0	20.2	228.5	20.9
1976	1326.0	100.0	816.5	61.6	243.9	18.4	265.6	20.0
1977	1489.0	100.0	945.1	63.5	261.5	17.6	281.4	18.9
1978	1579.7	100.0	1041.5	65.9	270.8	17.1	267.4	16.9
1979	1803.0	100.0	1252.1	69.4	264.9	14.7	286.1	15.9
1980	1822.7	100.0	1200.4	65.9	281.3	15.4	341.0	18.7

Source: Department of Commerce, Bureau of the Census, Census of Manufactures and the Annual Survey of Manufactures.

Table IV-4. The leather industry, interest as a percent of sales (business receipts).

FISCAL YEAR	ASSET SIZE ($000) ZERO ASSETS	OVER ZERO UNDER 100	100 UNDER 250	250 UNDER 500	500 UNDER 1000	1000 UNDER 5000	5,000 UNDER 10,000	10,000 UNDER 25,000	25,000 UNDER 50,000	50,000 UNDER 100,000	100,000 UNDER 250,000	INDUSTRY TOTAL
	Percent											
1968-69	0.18	0.33	0.42	0.52	0.48	0.59	0.88	1.37	--	1.14	1.60	0.69
1969-70	0.43	0.52	0.43	0.55	0.36	0.80	0.69	1.66	--	1.67	2.45	0.84
1970-71	0.00	1.34	0.82	0.64	0.56	0.99	0.84	1.27	--	1.85	2.61	1.03
1971-72	0.29	1.20	0.98	0.77	0.54	0.81	0.46	1.58	--	1.27	1.36	0.84
1972-73	0.47	0.37	0.66	0.48	0.64	0.63	0.39	1.52				0.83
1973-74	--	0.79	0.99	0.75	0.79	0.99	0.98	1.74	1.53	--	--	1.03
1974-75	--	0.30	1.33	0.70	0.90	1.40	1.00	1.20				1.10
1975-76	--	0.80	0.90	0.90	1.00	1.10	0.90	0.90	--	--	--	1.0
1976-77	--	0.40	0.30	0.20	0.60	0.70	0.70	0.70	0.30	--	--	0.60

Source: 1968-69 through 1973-74: Department of the Treasury, Internal Revenue Service, Source Book of Statistics of Income, Annual, Active Corporations with and without Returns.

1974-75 through 1976-77: Troy, Leo, Almanac of Business and Industrial Financial Ratios, 1978.

Depreciation is also considered a fixed cost. Typically it represents between 5 and 10 percent of the firm's total fixed assets for an expected asset life of between 10 and 20 years.

C. Industry Profitability

The leather tanning industry in the United States experienced difficulty during the early 1970's, particularly in 1972 and 1973, as a result of the rapid rise in the price of hides, which was caused by the tremendous increase in cattlehide exports. Between 1970 and 1973, 31 tanneries discontinued operations and total movement of cattlehides to U.S. tanners dropped from 19.2 million hides in 1972 to 17.7 million in 1973.

Between 1974 and 1976, industry performance was considerably improved. Demand for leather was up and the long-run picture appeared strong. Industry production increased in both 1975 and 1976, with 1976 production the highest level since 1972. Because of large herd reductions from 1974-1976, cattle hides were readily available. Sales were at an all-time high in 1976 and profits were acceptable; however, in 1977, American tanning began to decline both in real dollar volume and units produced. The end of herd liquidation and the retention of large numbers of cattle to rebuild stocks, plus increasingly high foreign demand, tightened the supply of raw hides. From 1977-1979, hide prices rose and production declined. The production decline continued through 1980. A high level of raw hide and skin exports and sustained level of imports of leather and leather products are expected to limit real growth as measured by unit production.

1. Net Profits on Sales

Net profits, before taxes and expressed as percentages of sales, are depicted in Table IV-5 for the years 1970 through 1981. Prior to 1974, the industry's profits were relatively stable, but low. As explained above, 1973 was a particularly bad year for the industry and profits were the lowest during the twelve year period. Increased demand for leather products as well as improvements in the industry's raw hide supply were significant factors in the industry's improved profitability during 1974 and 1975. However, strong competition from foreign leathers and even stronger competition from these foreign tanners for raw hides have caused the industry's profit to decline since 1976, fluctuating generally between 2.0 and 4.0 percent. Compared to the profit levels of all manufacturing industries, the leather tanning industry's profits were considerably less than those of all manufacturing, which has ranged between 7.5 to 9.0 percent.

When the leather industry's profitability is viewed for various sized operations, it becomes apparent that the medium and large tanneries tend to be more profitable than are the smaller operations (Table IV-6). This may reflect some economies of scale, however it should be noted that the profits of the largest size category in Table IV-6 are consistently less than the next smaller size category for the year between 1968 and 1973. Thus, while economies of scale may be important, other factors like operating efficiency and serving a unique market have influence also.

Table IV-5. The leather tanning industry profitability, 1970-1981

Year	Profits Before Tax as Percent of Sales (%)	Percent Profits Before Tax to Worth (%)	Cash Flow as Percent Sales (%)
1970	2.2	N.A.	4.7
1971	2.4	N.A.	4.0
1972	2.5	10.0	4.4
1973	1.9	14.1	2.9
1974	6.0	12.7	N.A.
1975 DPRA Survey	6.7	17.9	N.A.
Robert Morris	6.5	20.0	N.A.
1976	4.2	15.5	5.7
1977	2.1	19.6	3.3
1978	3.7	23.9	4.7
1979	1.9	15.5	2.8
1980	3.6	13.1	4.9
1981	2.4	NA	NA

Source: 1970 & 1971, Department of the Treasury, Internal Revenue Service, Source Book of Statistics of Income, Annual.

1972 to 1981 Robert Morris Associates, Statement Studies, Annual.

1975, Information from a data collection portfolio sent to the industry by DPRA.

Table IV-6. The leather industry, net profits before tax by asset size, FY 1969-1977

	ASSET SIZE ($000)											
FISCAL YEAR	ZERO ASSETS	OVER ZERO UNDER 100	100 UNDER 250	250 UNDER 500	500 UNDER 1,000	1,000 UNDER 5,000	5,000 UNDER 10,000	10,000 UNDER 25,000	25,000 UNDER 50,000	50,000 Under 100,000	100,000 UNDER 250,000	INDUSTRY TOTAL
	----------	----------	----------	----------	----------	Percent of Net Sales	----------	----------	----------	----------	----------	----------
1968-1969	11.7	-2.2	1.7	2.1	4.0	5.0	7.5	6.2	---	7.7	3.8	4.1
1969-1970	4.0	-0.0	1.2	2.1	0.4	2.5	3.8	0.1	---	4.5	2.7	2.2
1970-1971	---	-6.5	-0.9	0.1	2.7	2.0	5.1	5.9	---	4.8	3.6	2.4
1971-1972	21.9	-4.6	2.5	-0.5	2.6	2.8	1.7	6.9	---	6.1	1.9	2.4
1972-1973	---	---	0.9	1.8	3.1	1.3	1.4	3.8	---	1.5	1.0	1.7
1973-1974	2.3	-9.5	1.6	-1.1	0.1	2.2	1.4	2.4	6.4	---	---	1.2
1974-1975	---	---	0.8	1.9	0.5	2.0	---	7.2	---	---	---	1.7
1975-1976	---	2.4	5.4	2.7	---	2.8	0.7	8.4	---	---	---	3.3
1976-1977	---	2.3	3.4	2.3	1.8	1.9	1.3	6.2	17.3	---	---	3.1

Source: 1968-69 to 1973-74: Department of the Treasury, Internal Revenue Service, Source Book of Statistics Income, Annual.
1974-75 to 1976-1977: Troy, Leo, Almanac of Business and Industrial Financial Ratios, Annual 1978 and 1979 (Compiled from IRS data).

2. Return on Investment

Information regarding the industry's return on investment is difficult to obtain. However, as reported in Robert Morris' Statement Studies, the industry's returns before taxes appear to have been between 10 and 15 percent during the 1972 to 1974 time period. In 1975, the industry's returns were determined to be 17.9 percent according to an industry survey and 20.0 percent according to the Robert Morris data. Returns in 1976 were somewhat lower, 15.5 percent, while in 1977 returns rose to 19.6 percent. In 1978, returns jumped to 23.9 percent and then declined to 13.1 percent in 1980.

3. Cash Flow

Cash flow represents the cash that is actually available for distribution, retention, or use in acquiring additional assets. The data in Table IV-5 indicates that cash flows as a percent of sales were relatively small from 1970 to 1973. While data are not available for 1974 and 1975, increased profits probably would result in substantially higher cash flows. Robert Morris Associates data shows high cash flows of 5.7 percent in 1976. In 1979, cash flows in the industry dropped to only 2.8 percent of sales. In 1980, cash flows were 4.9 percent of sales.

D. Financial Structure of the Industry

1. Assets

The leather tanning and finishing can be considered a raw materials oriented industry. Tanners maintain relatively large quantities of hides and skins as a major component of their firms' capital requirements. As shown in Table IV-7, current assets, which reflect the capital that tanners require to maintain in-process leather and adequate supplies of raw hides and skins, have represented between 61 and 75 percent of the industry's total assets between 1969 and 1980.

Contract tanners and finishers are major exceptions, since they do not buy hides to process and only perform a service for hide owners. In their operations, tanning and finishing supplies and equipment would account for most of the capital requirements.

The fixed assets of the industry represent the conventional elements in every manufacturing or processing industry, i.e., the plant, land, and equipment. The fact that fixed asset requirements are a relatively minor portion of total assets does not imply that the industry requires relatively few fixed assets. Rather, it reflects the significant amount of capital required for hides, and the fact that most tanneries are older facilities whose costs of fixed assets are significantly less than newer capital.

Table IV-7. The leather industry assets, liabilities and equity, selected years

	1969	1970	1971	1972	1973	1974	1975	Industry response 1975	1976	1977	1978	1979	1980
	------------------percent------------------												
Assets													
Current Assets	70	66	61	70	69	75	69	65	67	69	71	69	72
Fixed Assets	30	34	39	30	31	25	31	35	33	31	29	31	28
Total Assets	100	100	100	100	100	100	100	100	100	100	100	100	100
Liabilities and Equity													
Long Term Debt	19	17	15	13	16	17	18	11	19	15	14	14	14
Current Liabilities	28	32	27	29	35	33	28	28	35	46	44	46	42
Net Worth	53	51	58	58	49	51	54	61	46	39	42	40	44
Total Liabilities & Equity	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: 1968-1972, Department of the Treasury, Internal Revenue Service, Source Book of Statistics of Income, Annual.

1973-1978, Robert Morris Associates, Statement Studies-Annual, 1974-1981.

Response to industry data collection portfolio, 1975, Development Planning and Research Associates, portfolio sent to industry in 1976.

The distribution of assets varies among the various sizes of tanneries. As shown in Table IV-8, the smaller tanneries reflect a lower proportion of the total assets as fixed assets than do the larger tanneries, because the larger facilities are often newer, or have modernized their equipment and production process, and their capital expenditures are proportionately higher than those of the older, smaller facilities.

2. Liabilities

The liabilities of the leather tanning industry have been classified into two basic categories: (1) current, or short-term liabilities, and (2) long-term debt. The industry has maintained a large portion (approximately two-thirds) of its total liabilities in the form of short-term liabilities (Table IV-7). These short-term liabilities typically represent accounts payable, unpaid wages, loans for inventories and minor plant and equipment maintenance and replacement expenses. When expressed as a percent of total liabilities and equity, current liabilities have traditionally represented from 18 to 35 percent, and long term-debt from 15 to 19 percent. Equity has accounted for approximately 50-60 percent of total liabilities and equity. However, a significant change occurred in 1977 and 1978. Tanneries were forced to increase their short-term liabilities to finance higher priced hides resulting in an increase in current liabilities to 40 and 44 percent respectively.

Long-term debt within the leather industry represents approximately 20 percent of the industry's total assets and 40 percent of the industry's total liabilities. The somewhat low proportion of long-term debt reflects the relative age of the industry as most of the facilities and equipment were purchased many years ago and, thus, have been paid for or, at least, represent a lower purchase price than that obtainable today.

Most of the industry's long-term debt represents the debts of a few newer tanneries as well as debts incurred by older tanneries that have modernized or expanded their facilities.

When the industry's liability structure is viewed with respect to size (Table IV-8), it becomes apparent that the larger tanneries have a much more sizeable long-term debt proportion of total liabilities than do the smaller tanneries. Furthermore, the larger tanneries maintain a somewhat lower overall liability commitment than do the smaller tanneries.

3. Net Worth

The net worth of the industry is defined as its total assets less its total liabilities; thus, net worth represents that portion of the industry's assets that are owned by the industry. Net worth, expressed as a percent of total assets, has declined from a level of 50 to 60 percent of total assets during the 1969-1975 period to a level of about 40 percent in 1977-1978. This currently represents a debt-to-equity ratio of 1.4.

Net worth varies for both larger and smaller tanneries (Table IV-8), implying that tanneries' dependence on creditors for providing funds either for normal operations or capital improvements is not size dependent.

Table IV-8. The leather and leather products assets, liabilities and equity, by asset size, 1975

	Asset Size ($000) Under 100	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000-49,999	50,000-99,999	100,000-249,999	250,000 or more	Industry Total
	Percent											
Assets												
Current Assets	79	78	72	68	75	77	72	69	60	NA	63	68
Fixed Assets	21	22	28	32	25	23	28	31	40	NA	37	32
Total Assets	100	100	100	100	100	100	100	100	100	NA	100	100
Liability and Equity												
Long Term Debt	25	23	15	16	12	17	12	25	32	NA	21	20
Current Liabilities	59	32	31	38	42	36	26	26	23	NA	29	31
Net Worth	16	45	54	46	46	47	62	49	45	NA	50	49
Total Liability & Equity	100	100	100	100	100	100	100	100	100	100	100	100

Source: Department of the Treasury, Internal Revenue Service, Source Book of Statistics of Income, 1974-75.

E. Terms of Debt Capital

1. Financing New Investment

The ability of a firm to finance new investment for pollution abatement is a function of several financial and economic factors. In general terms, new capital must come from one or more of the following sources: (1) funds borrowed from outside sources; (2) equity capital acquired through the sale of common or preferred stock; and (3) internally generated funds--retained earnings and the stream of funds attributed to the depreciation of fixed assets.

For each of the three major sources of new investment, the most critical factor is the financial condition of the individual firm. For debt financing, the firm's credit rating, earnings record over a period of years, stability of earnings, existing debt-equity ratio, and the lenders' confidence in management will be major considerations. The discussions held with commercial lenders (brokers and representatives of commercial lending institutions) reported the final consideration in granting a loan is the expected profitability of the firm. Also potential investors tend to view investments in assets that will improve productivity more favorably than investments that will not reduce costs or increase sales. New equity funds through the sale of securities will depend upon the firm's future earnings as anticipated by investors, which in turn, will reflect past earnings records and the general condition of the money market. The firm's record, compared to others in its own industry and to firms in other similar industries, will be a major determinant of the ease with which new equity capital can be acquired. In the comparisons, the investor will probably look at the trend of earnings for the past five years.

Internally generated funds depend upon the margin of profitability and the cash flow from operations. Also, in publicly-held corporations, stockholders must be willing to forego dividends in order to make earnings available for reinvestment.

The firm's industry and general economic conditions are also major considerations in attracting new capital. The industry will be compared to other similar industries in terms of net profits on sales and on net worth, supply-demand relationships, trends in production and consumption, the state of technology, impact of government regulations, foreign trade, and other significant variables. Declining or depressed industries are not good prospects for attracting new capital. At the same time, the overall condition of the domestic and international economy can influence capital markets. A firm is more likely to attract new capital during a boom period than during a recession. On the other hand, the cost of new capital will usually be higher during an expansionary period. Furthermore, the money markets play a determining role in new financing.

2. Expenditures for Plant and Equipment

Capital expenditures, as reported by the Annual Survey of Manufactures and the Census, fluctuated between $4.7 and $7.2 million from 1960 through 1964 and increased sharply in 1965 and, again, in 1966, to $17.3 million. Expenditures remained at about the same level, with only slight declines, between 1966 and 1972. In 1973 and 1974, expenditures declined to about $13 million. Since 1974, expenditures have increase, with 1976 expenditures totaling $32.6 million and 1977 expenditures equalling $31.9 million (Table IV-9). A closer look at the $31.9 million spent in 1977 shows $6.8 million or 21 percent used for new structures and plant additions; 75 percent or $24 million on new machinery and equipment; and $1.2 million on used equipment. Total expenditures in 1977 amounted to 14 percent of the estimated fixed assets of the industry. Since 1977, expenditures have increased at an average annual rate of 16 percent, reaching $48.3 million in 1980.

3. Terms of Debt

The industry has a large number of family-owned and operated plants, especially in the small and medium size categories. A few of the larger plants are divisions of major corporations; however family owned firms predominate in the industry. The industry has tended to finance capital investments with internally generated capital. This is indicated by the low level of long term debt (14 percent) on Table IV-7.

To estimate the likely loan terms a tanner might receive, a telephone survey was made to tanners and lending institutions. The phone survey indicated that loan repayment periods would range from 3 to 7 years. For the economic analysis a 5-year loan period is used. Based upon the telephone survey, interest rates on these loan are expected to be approximately 1.5 percentage points above prime interest rates. This is because tanneries would have to pay a premium interest rate compared to the large companies that can obtain prime rate loans.

F. Cost of Capital - After Tax

Return on invested capital is a fundamental notion in U.S. business. It provides both a measure of the actual performance of a firm as well as its expected performance. It is also called the cost of capital--the weighted average of the cost of each type of capital employed by the firm, generally equities and interest-bearing liabilities. There is no methodology that yields the precise cost of capital, but it can be approximated within reasonable bounds.

The after-tax cost of capital was estimated by evaluating various financial parameters relevant to the tanning industry over the period of 1979 to 1981. The cost of debt capital and return on equity realized by the tanning industry was estimated as discussed below. Debt capital and equity

Table IV-9. Expenditures for new plant and new equipment in the leather tanning and finishing industry ($ million)

Year	Total new expenditures	New structures and plant additions	New machinery and equipment	Used plant and equipment
1960	6.1			
1961	4.7			
1962	7.2			
1963	6.5	.8	6.2	.5
1964	7.8			
1965	11.3			
1966	17.3			
1967	16.7	5.2	11.6	.9
1968	16.6			
1969	14.4	3.0	11.4	
1970	12.4	1.9	10.6	
1971	17.7	3.5	14.3	
1972	16.3	3.6	12.7	1.2
1973	12.8			
1974	13.1			
1975	22.7	6.1	16.6	
1976	32.6	12.4	20.2	
1977	31.9	6.8	23.9	1.2
1978	51.1			
1979	43.9			
1980	48.3			

Source: Census of Manufactures and Annual Survey of Manufactures.

capital were weighted utilizing Robert Morris' survey data; the equity weight is estimated at 42 percent and the debt weight at 58 percent. This represents the weight of all capital--short and long term--as described on Table IV-8. The after tax cost of capital developed for the leather tanning industry, representing the average rate over the 1979-1981 period, is estimated to be 11 percent as shown below:

Item	Weight	Before tax cost	Average tax rate	After tax cost	Weighted cost
Debt	.58	17.1	.36	10.94	6.35
Equity	.42	17.5	.36	11.20	4.70
					11.05

Before tax cost of debt was based on the average prime rate of 15.6 over the 1979-81 period, plus 1.5 percent which represents an average premium tanners would pay. An average tax rate of 36 percent was used representing the average actual corporate tax rate paid by all manufacturing firms over the same period as reported by the Federal Trade Commission's Financial Quarterly Report.

V. PRICE AND PRICE DETERMINATION

The analysis of price determination is a highly complex subject area and is dependent on many factors outside the direct markets for leather. Leather is priced in an intermediate market. The price of leather is highly dependent on the price of cattle hides, which is set in an international market. Demand for leather, on the other hand, is derived from the demand for finished leather goods. The interaction of economic and natural forces affecting the various components of supply and demand result in a very volatile price for raw hides and tanned leather.

In this chapter, the tanning industry's prices and price determination processes will be analyzed to determine the ability of individual firms to pass increased costs, resulting from the imposition of effluent control guidelines, forward to the users of tanned leather, backward to the hide suppliers, or both. If price pass-through cannot be accomplished because of market forces, then it must be determined if the firms have the ability to absorb the incremental costs in their profit margins.

In the following sections, characteristics of recent price and price determination factors will be assessed, including a qualitative and quantitative analysis of supply, demand, and leather prices plus an evaluation of leather product imports and associated trade restrictions. Finally, an analysis of the raw hide markets will be presented and will include discussions of the international trade in and trade restrictions over raw hides.

A. Leather Prices, Demand, and Supply

The price of leather in the United States has been highly variable in recent years. Market prices were fairly low in the early seventies and increased steadily through 1976. In 1977, the leather industry again experienced a depressed market as both dollar volume and unit production declined. Hide prices escalated rapidly in 1978 and 1979, due primarily to lower slaughter numbers and the weakness of the U.S. dollar. This caused a period of great uncertainty in the industry as hide prices doubled from 1977 to 1979 before returning to more normal levels in 1980 and 1981. During the 1970 to 1980 period, leather production declined at an average rate of 3 percent per year and shoe imports increased from 33 percent of total U.S. consumption to 50 percent.

This section discusses the supply, demand and resulting prices for finished leather. Hide prices, a major component of leather price, are discussed in Section C of this Chapter, "The Raw Hide Market."

1. The Price of Leather

Historically, there has been a stable relationship between the prices of leather and hides. The relationship was essentially absolute and was reflected by stable margins between the raw material and finished product prices--especially for the period from the late 1950's to 1971. After 1971, market disruptions made it difficult to maintain historical margins, and classical relationships had to be adjusted in order to retain sales, although the margin adjustment usually resulted in a loss.

The data in Table V-1 include the current and real dollar values for leather (wholesale), cattlehides (pound-price converted to equivalent of one square foot of leather), and the equivalent square foot price spread or margin. The hide-to-finished price spread is shown in Figure V-1 to more clearly depict the recent price spreads. Over time, the current dollar price spread has been increasing at about the rate of 1.0 cents per square foot, per year. 1/ Based on the 1955-81 average price spread of 39 cents per square foot, the average annual change or increase has been about 2.6 percent per year. The increase is necessary to offset increasing production costs which consume much of the price spread.

In real dollars, however, the price spread has been declining at about .56 cents per square foot, per year. 2/ This is equal to the average annual decrease of 1.3 percent per year with the 26 year average real-dollar margin of 40.9 cents per square foot. Thus, although the margin has been increasing in current dollars, the increase has not kept pace with the value of the dollar and the margin has declined in real terms.

Leather is priced in an intermediate market. A statistical examination of the factors effecting the change in leather prices over the period 1972 through 1979, identified 86 percent of the variation as attributable to change in hide prices and the volume of leather produced. As expected, leather prices move in a direct relationship to hide prices and as the volume of leather produced increased (decreased) the leather price correspondingly decreased (increased). Since most costs of the tannery (with the exception of hides) are fixed over the short run, including labor, greater volume decreases the cost to produce additional tanned hides. Because of competitive forces within the industry, these savings are passed through to the consumer.

This relationship using quarterly data from 1972 through 1979 is shown in the following equation:

1/ 1.00 cents per square foot per year is coefficient of the trend line equation $Y_t=24.57 + 1.0t$, $r=.69$, where Y_t=margin in year_t, and $t=1, 2, \ldots, 25$ starting with 1955.

2/ .56 cents per square foot per year is the coefficient of the trend line equation: $Y_t=49.6 - .56t$
Where: y_t = real dollar margin in year_t
$t = 1,2,\ldots, 25$ starting with 1955.

Table V-1. Leather, price per square foot, 1955 to 1981 1/

Year	Current Dollars			Real Dollars 4/			
	Hide Price 2/	Finished Leather Wholesale Price 3/	Hide to Finished Leather Spread	Hide Price	Finished Leather Wholesale Price	Hide to Finished Leather Spread	Hide to Finished Leather Spread as a Percent of Finished Leather Price
	¢/sq. ft.			¢/sq. ft.			Percent
1955	21.7	44.4	22.7	35.6	72.8	37.2	51.1
1956	21.7	49.9	28.2	34.5	79.3	44.8	56.5
1957	19.2	48.6	29.4	29.5	74.8	45.3	60.5
1958	20.0	50.6	30.6	30.3	76.5	46.2	60.4
1959	33.6	62.5	28.9	49.8	92.6	42.8	46.2
1960	24.0	55.5	31.5	34.9	80.8	45.9	58.0
1961	26.1	58.9	32.8	37.7	85.0	47.3	55.7
1962	26.6	61.9	35.3	37.7	87.7	50.0	57.0
1963	19.6	57.7	38.1	27.4	80.6	53.2	66.0
1964	18.0	58.1	40.1	24.8	79.9	55.1	69.1
1965	24.3	59.3	35.0	32.7	79.8	47.1	59.1
1966	30.4	64.4	34.0	39.6	83.9	44.3	52.8
1967	20.5	59.8	39.3	26.0	75.7	49.7	65.7
1968	20.6	61.1	40.5	24.9	74.0	49.1	66.2
1969	25.2	66.1	35.9	29.1	76.2	47.1	68.8
1970	22.4	64.1	41.7	24.5	70.1	45.6	65.0
1971	25.4	63.9	38.5	26.5	66.6	40.1	60.3
1972	52.1	80.4	28.3	52.1	80.4	28.3	35.2
1973	59.0	88.6	29.6	55.8	83.7	27.9	33.4
1974	45.3	82.8	37.5	38.9	71.1	32.2	45.3
1975	41.1	79.9	38.8	32.3	62.8	30.5	48.5
1976	57.8	110.9	53.1	43.2	82.9	39.7	47.9
1977	63.4	108.7	45.3	44.7	76.7	32.0	41.7
1978	82.6	128.9	46.3	54.3	84.8	30.5	36.0
1979	126.9	204.3	77.4	76.7	123.4	46.8	37.9
1980	77.6	121.1	43.2	43.9	68.3	24.4	35.7
1981	76.7	124.5	47.8	39.6	64.3	24.7	38.4

1/ Sources: Hide prices - USDA, Livestock and Meat Statistics
Leather prices - Department of Labor, Bureau of Labor Statistics, Wholesale Price Index.

2/ Heavy Native Steer Hides converted to raw hide equivalent of one square foot tanned leather (1.75 pounds raw hide yields 1.0 square foot of tanned leather).

3/ Upper leather, cattle and kid sides, smooth.

4/ Prices adjusted by the GNP Implicit Price Deflator, Total GNP, 1972 = 100.

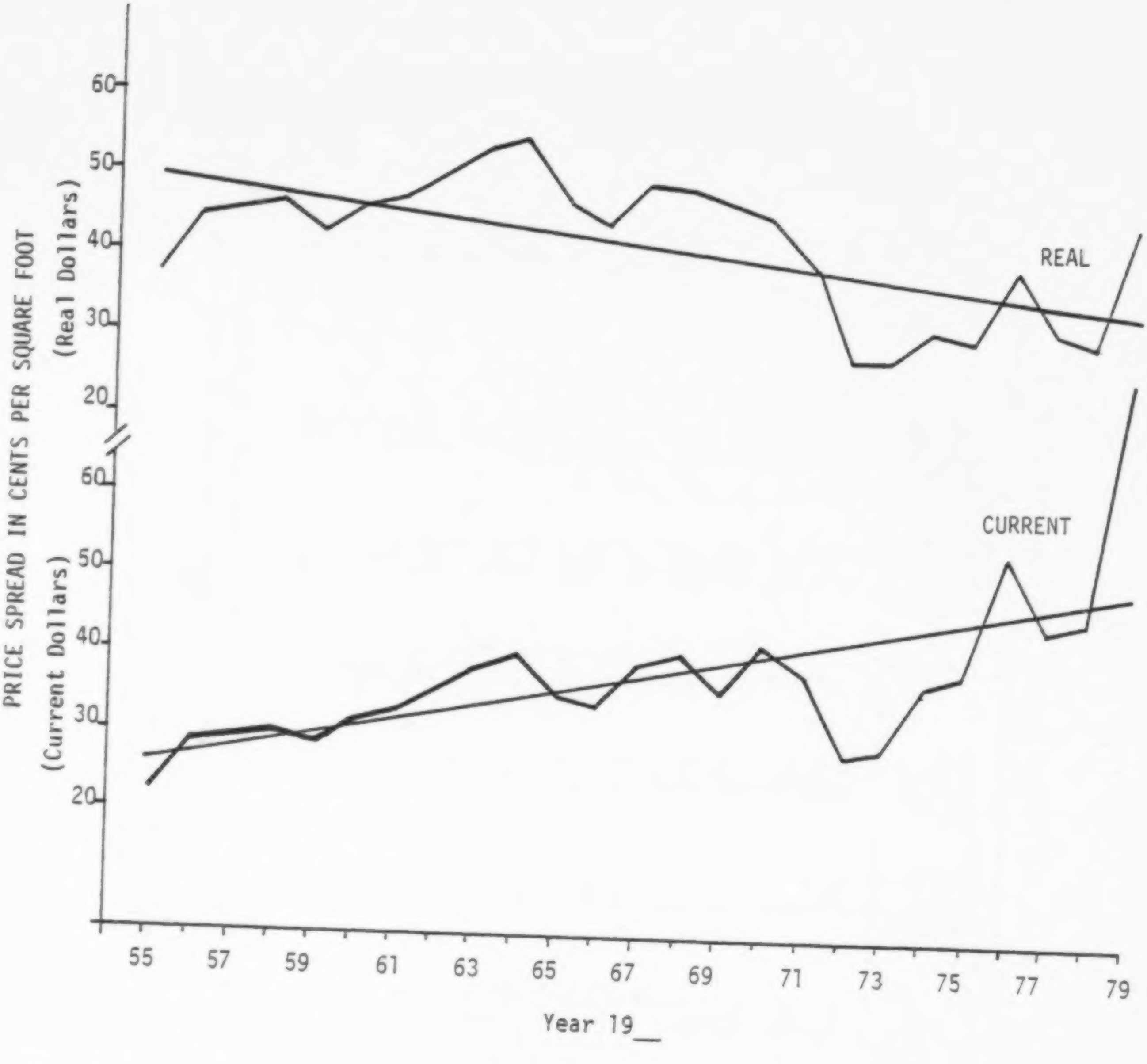

Figure V-1. The tanned leather equivalent price spread between the price of cattle hides and wholesale price of leather, cents per square foot, current and real dollars, 1955-1979.

$$\begin{array}{llllr}
\frac{\text{Leather Price}}{\text{WPI}} & = 72.1 & + 2.8 & \frac{\text{Hide Price}}{\text{WPI}} & - 0.006 \text{ Deliveries} \\
\text{(t stat)} & 4.7 & 12.7 & & -2.0 \\
\text{(std error)} & 15.3 & .22 & & .003 \\
 & R^2 = .86 & & &
\end{array}$$

where:

Leather price = wholesale price index for leather
Hide price = Heavy native steer hides ($ per pound)
Deliveries = Cattlehide leather deliveries (1000 hide equivalent)
WPI = Wholesale price index for all commodities

Both independent variables are statistically significant. A third independent variable, wage rates in the leather tanning industry, was tested and found to be statistically insignificant in terms of identifying changes in finished leather prices. The above multiple regression analysis tells us that a one percentage increase (decrease) in hide prices will result in a .56 increase (decrease) in leather prices. 1/

Similarly, a one percent increase (decrease) in deliveries has historically resulted in a decrease (increase) in leather prices by 1.3 percent, all other factors held constant. It is interesting to note that in a similar analysis using quantity data over the period 1968-1978, the USDA found that a 1 percent increase (decrease) in the price of hides increased (decreased) the index of leather prices by 0.26 percent. 2/

2. Demand for Leather

The leather tanning industry's annual production declined during recent years, decreasing from nearly 32.7 million hide equivalents in 1965 to 19.5 million in 1981 (Table IV-1). This reduction reflects a declining demand for U.S. produced leather and leather products caused, in part, by increased competition from both the foreign tanneries and leather product

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1/ Calculated by the elasticity formula $E_j = B_j \frac{X_j}{Y}$

where $.56 = 2.8 \left[\frac{20.96}{104.6}\right]$

2/ USDA "The Structure, Pricing Characteristics, and Trade Policy of Hides, Skin, Leather and Leather Products Industry - A Task Force Report," Washington, D.C. 20250, July 1979.

manufacturers, and leather substitute manufacturers. This section discusses both the domestic and international markets for U.S. produced leather and their respective trends and influences on the demand for leather. These sections are followed with a quantitative analysis of the demand for leather.

Domestic Markets. The demand for leather in the United States has largely been derived from the needs of the U.S. shoe industry. However, in recent years the domestic shoe manufacturing industry has lost major portions of its markets to imported shoes; its demand for leather has declined and the demand from producers of other leather products has increased.

The domestic shoe manufacturing industry, the primary customer for U.S. tanned leather, has slowly but steadily been losing its share of the domestic market to international competition. In 1965, only 12.3 percent of the shoes purchased in the U.S. were manufactured overseas; however, by 1981, this had increased to 50.0 percent, and indications are that this trend will continue over the foreseeable future. During this time, the total U.S. demand for shoes fluctuated only slightly but in recent years, since the advent of high inflation, the trend has been down. Per capita consumption of shoes reached a peak in 1968 with 4.07 pairs and declined to 3.28 pairs in 1975. In 1976, it recovered significantly, increasing to 3.68 pairs, but has declined each year, since reaching 3.27 pairs in 1981.

The effect of the relatively stable U.S. demand for shoes and increasing imports has been that the total pairs of shoes manufactured in the U.S. has declined steadily from 626 million pairs in 1965 to the 1981 level of 375 million pairs, a decline of 40 percent over the sixteen year period (Table V-2). A further indication of the decline in the shoe industry's demand for leather can be seen in Table V-2 which shows the percent of U.S. manufactured shoes made with leather soles. This has declined steadily over the past thirty years; by 1981, only 11.0 percent of the U.S. shoes were made with leather soles, down from 24.6 percent in 1965. Also, during the 70's, the substitution of synthetics for leather in shoe uppers made substantial inroads in the market. In 1960, only 16.9 percent of the U.S. shoes were made with all synthetic uppers. In 1979 the figure was 44.4 percent.

In summary, the quantity demanded by domestic shoe manufacturers for U.S. produced leather declined from 78 percent of the total leather produced in the U.S. in 1970 to 53 percent in 1977. Since that time it has increased steadily to 56 percent in 1978 and 62 percent in 1981.

Other domestic markets for U.S. produced leather include manufacturers of such products as leather garments, gloves, and handbags. In 1975, leather garment demand was encouraging, utilizing 190 million square feet of domestic leather or 14.4 percent of domestic production. The rapid increase of imports of Korean leather garments--some imported at extremely low prices--have depressed that market. By 1981, utilization had dropped to 35 million square feet or 3.6 percent of domestic production. Markets where demand still appears strong, however, include: leather work gloves,

Table V-2. U.S. production of shoes 1965-1981 (1,000 pair)

	Total U.S. Production	Percent of U.S. Production With Leather Soles	Imports		Total Shoes	Pairs per Capita
			Total	Percent of Total U.S. Consumption		
1965	626,229	24.6	87,632	12.3	713,861	3.67
1966	641,696	24.8	96,135	13.2	737,831	3.75
1967	599,964	21.7	129,137	17.7	729,101	3.66
1968	642,427	17.4	175,292	21.4	817,719	4.07
1969	576,961	14.8	202,040	25.9	779,001	3.83
1970	562,318	16.4	241,560	30.0	803,878	3.91
1971	535,777	16.0	268,569	33.4	804,346	3.89
1972	526,655	17.0	296,665	36.0	823,320	3.94
1973	490,033	14.0	315,514	39.2	805,547	3.83
1974	452,955	14.2	266,423	37.0	719,378	3.39
1975	413,080	13.3	286,538	41.0	699,618	3.28
1976	422,507	13.7	370,001	46.7	792,508	3.68
1977	413,726	12.1	368.069	47.1	781,795	3.61
1978	418,948	11.9	373,515	47.1	792,463	3.62
1979	398,872	11.5	404,563	50.4	803,435	3.57
1980	396,651	10.2	365,743	48.0	762,594	3.35
1981	375,473	11.0	375,605	50.0	751,078	3.27

Source: Tanner's Council of America, "Membership Bulletin Leather Industry Statistics."

8.6 percent of the domestic leather produced; leather handbags, 6.1 percent; leather belts, 5.6 percent; small leather goods, 7.1 percent; and miscellaneous, 7.1 percent (Table V-3). However these segments represent less than 40 percent of the leather utilization in the United States.

Foreign Markets. Leather exports offer the newest potential market for U.S. leather tanners. In 1968, U.S. exports of leather and leather products consisted mainly of leather luggage and represented only 1 percent of the total 1968 domestic leather production. By 1975, exports of leather amounted to 13.8 percent, and exports in 1979 were approximately $250 million or 12.7 percent of the total domestic production.

While U.S. tanners and leather product manufacturers are attempting to expand their exports, higher wages and raw material costs have forced manufacturers to raise the prices of domestic leather and leather products. While the devaluation of the U.S. dollars in the early 1980s has helped to keep U.S. leather prices competitive, the devaluation was not uniform. In some cases, it reduced the ability of some U.S. manufacturers to compete in that country's market and has actually increased the attractiveness of the U.S. market for potential imports of foreign finished leather products from that country. There is, however, an encouraging trend among foreign exporting leather manufacturers: some import semi-tanned or semi-processed leather instead of raw hides and produce finished leather products for their domestic or export markets. Several reasons support this trend. First, more foreign leather tanners must import raw hides to supplement their domestic supplies. The semi-tanned leather is considerably lighter in weight than are raw hides and, accordingly, less costly to ship. Also, many countries are facing increasingly more strict pollution control regulations, and the importation of semi-tanned leather instead of raw hides significantly reduces their pollution control requirements. Tanners in many foreign developed countries are finding it difficult to maintain an adequate, experienced labor force. The importation of semi-tanned leather eliminates the need for a large labor force.

The increased trend for foreign tanners and leather product manufacturers to buy semi-tanned leather is reflected by data appearing in the Reports of the Bureau of the Census. These data are depicted in Table V-4 and show the U.S. exports of leather by classes for 1975 through 1979. As shown, leather exports increased from $140 million in 1975, to $150 million in 1977, and to $250 million in 1979. While many classes of leather shown on Table V-4 increased in monetary value, a substantial portion of the increase was for the rough and crust.

3. Elasticity of Demand for Leather

If pollution control costs are passed on in higher leather prices, what would the effect be on the demand for leather? A 1976 study 1/ concluded

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1/ James Jondrow and others, The Effects of Effluent Discharge Limitations on Foreign Trade in Selected Industries, Document 260-76, Public Research Institute, Alexandria, Va., Feb. 1976; a report for the National Commission on Water Quality.

Table V-3. Leather markets profile, 1977-1981

Products	Total market supply	Domestic production	Imports	Imports as % of total market	Leather equivalent of domestic prod. Sq. ft.	Leather equivalent of domestic prod. Percent
	(mil)	(mil)	(mil)	(%)	(mil)	(%)
			1977			
Shoes (non rubber)	759	391	368	48.5	630	52.8
Leather garments	10	3.6	6.4	64	150	12.6
Leather work gloves (million dozen pairs)	5.8	3.6	2.2	38.5	105	8.8
Leather handbangs	31.6	19	12.6	40	105	8.8
Small leather goods	74.5	65	9.5	13	65	5.5
Leather Belts	48	43	5	10.4	48	4.0
Miscellaneous	NA	NA	NA	NA	90	7.5
TOTAL					1,193	100.0
			1978			
Shoes (non rubber)	763	389.9	373.5	49.0	625	56.2
Leather garments	10	3	7	70	100	9.0
Leather work gloves (million dozen pairs)	6.1	3.8	2.3	37.7	111	10.0
Leather handbags	36	15.5	20.4	57	70	6.3
Small leather goods	81	70	11	13.6	70	6.3
Leather belts	51	44	7	14	45	4.1
Miscellaneous	NA	NA	NA	NA	90	8.1
TOTAL					1,111	100.0
			1979			
Shoes (non rubber)	785.7	381.1	404.6	51.5	550	57.0
Leather garments	9.2	1.9	7.3	79	40	4.1
Leather work gloves (million dozen pairs)	7.2	3.6	3.6	50	115	11.9
Leather handbags	30	13	17	56.6	55	5.7
Small leather goods	86	76	10	11.6	75	7.8
Leather belts	57	50	7	12.3	50	5.2
Miscellaneous	NA	NA	NA	NA	80	8.3
TOTAL					965	100.0
			1981			
Shoes (non rubber)	751.1	375.5	375.6	50.0	610	61.9
Leather garments	8.4	1.8	6.6	78.6	35	3.6
Leather work gloves (million dozen pairs)	5.6	2.6	3.0	53.6	85	8.6
Leather handbags	33.2	12.2	21.0	63.3	60	6.1
Small leather goods	78.0	70.0	8.0	10.3	70	7.1
Leather belts	58.5	51.5	7.0	12.0	55	5.6
Miscellaneous	NA	NA	NA	NA	70	7.1
TOTAL					985	100.0

Source: Tanners' Council of America "Membership Bulletin Leather Industry Statistics."

Table V-4. United States exports of leather by classes 1975-1979 (quantity in thousands of units showing value in thousands of U.S. dollars)

Item	Unit	1975		1976		1977		1978		1979	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Cattle--											
Patent	SFT	5,534	3,210	2,078	1,399	2,209	1,503	1,844	1,945	1,091	1,320
Side Upper	SFT	105,073	52,831	131,038	58,204	124,099	51,178	24,470	18,578	31,030	36,389
Sole, Belting, Welting	LB	9,377	5,938	8,797	4,350	7.986	5,685	3,371	3,192	5,016	8,241
Belting	SFT	-	-	-	-	-	-	-	-	-	-
Glove & Garment	SFT	-	-	-	-	-	-	33,928	28,173	33,447	34,573
Bag, Case, Strap, Collar	SFT	-	-	-	-	-	-	-	-	-	-
Rough, Russet & Crust	Lb	11,778	3,702	8,272	3,061	13,386	9,315	101,620	40,200	77,953	42,267
Bovine, NSPF, Not Fancy	SFT	-	-	-	-	-	-	20,466	10,128	28,167	19,053
Upholstery	SFT	-	-	-	-	-	-	5,702	4,326	4,937	12,346
Calf & Kip	SFT	2,020	1,040	3,112	1,921	3,334	2,536	8,545	6,206	5,784	6,459
Sheep & Lamb	SFT	62,096	41,073	61,666	40,361	69,771	43,694	53,725	41,386	40,758	39,592
Sheep & Lamb, Vegetable Tan	LB	-	-	-	-	-	-	-	-	-	-
Goat & Kid	SFT	7,140	5,071	4,197	4,029	3,573	3,564	4,332	4,777	3,741	6,131
Goat & Kid, Vegetable Tan	LB	-	-	-	-	-	-	-	-	-	-
Other	--	-	27,632	-	-	-	32,311	49,464	31.751	46,079	39,170
Pig & Hog Leather	--	-	-	-	-	-	-	6,324	3,894	7,534	4,921
TOTAL			140,497		139,268		149,787		194,555		250,462

Source: Reports of the Bureau of the Census, Office of Consumer Goods & Service Industries, Bureau of Domestic Business Development, Industry and Trade Administration, U.S. Department of Commerce, May, 1976-March, 1980.

that the main effect on the demand for domestically produced leather would come not from a reduction in the number of shoes bought by U.S. consumers, but, rather, through an increase in shoe imports, substituting for domestically produced shoes, thereby reducing the demand for domestically tanned leather. Hence, a critical variable is the import elasticity for shoes.

An increase in the price of domestically produced leather can also result in an increase in the imports of leather as U.S. manufacturers are encouraged to substitute foreign leather for domestic. This effect was discussed by Cambridge Research Institute in their comments on the 1979 economic impact study on proposed guidelines. Other more minor effects would include the imports of other leather goods (other than shoes) and a decrease in the export of leathers. Each of these effects will be discussed in turn.

A review of the literature provides estimates of the import elasticities for shoe imports and leather imports as summarized in Stern 1/ in terms of the lowest estimate reported in the literature, the highest and the "best" estimate.

	Low	"Best"	High
Shoe imports	-0.79	-2.39	-4.31
Leather imports	-0.74	-1.58	-2.42

The elasticities are defined as the percentage change in import quantity resulting from a one percent increase in the price of the domestic product relative to the price of imports.

Calculation of the effects of an increase in the price of leather on domestic leather production requires the consideration of various linkages. For example, for shoes and leather goods, we consider the linkages from the increase in leather prices to the increase in the price of the product faced with foreign competition (e.g., shoes), to the change in impact quantity (shoes), to the change in domestic production (shoes), to domestic leather production. In calculating the effects, it is assumed that domestic leather production is distributed as follows:

Shoe production	.58
Other leather products	.29
Leather exports	.13
	1.00

1/ Robert Stern, Jonathan Francis and Bruce Schumacher, Price Elasticities in International Trade, An Annotated Bibliography, New York, Macmillan, 1976, p. 22.

and that leather imports are equivalent to 16 percent of domestic production. 1/ The calculations are for the effects of a hypothetical one percent increase in leather prices (the price increase actually estimated is presented later) and are described for the "best" estimate of elasticity.

In estimating the effect of a leather price increase on shoe imports, the leather price increase first has to be translated into a shoe price increase. Based on 1977 data, the cost of leather relative to the value of shipments for shoe manufacturing was 0.20. 2/ Hence, the elasticity of shoe imports relative to a one percent increase in leather prices is

$$(0.20)(\text{shoe import elasticity}) = (.020)(2.4) = 0.48.$$

Imports and domestic shoe production split the U.S. market in 1981. Hence, a 0.48 percent increase in shoe imports corresponds to a 0.48 percent decrease in domestic shoe production. Since shoe production accounts for 0.58 of domestic leather production, domestic leather production is reduced by 0.28 percent (0.48 x 0.58 = 0.28 percent).

Imports of leather products other than shoes will also increase with an increase in domestic leather prices. However, we do not have estimates of the corresponding elasticities and thus will use those for shoe imports (2.39 for the "best" estimate). Similarly, to translate the leather price increase into a leather goods price increase we will use the cost of leather as a percent of the value of shipment for shoe manufacturing or 20 percent as a proxy. Then the elasticity of leather product imports relative to a one percent increase in leather prices is (0.20)(2.4) = 0.48. Since the quantity of leather good imports is approximately equal to domestic production of such goods, 0.48 is the expected decline in domestic production. Leather goods production uses 0.29 of domestic leather production, so the effect on domestic leather production is a reduction of 0.14 percent for a one percent increase in leather prices (0.48 x 0.29 = 0.14 percent).

The third effect, the impact on leather imports, can be estimated as follows. Actual leather imports amounted to approximately $350 million in 1981, 16 percent of domestic tanners' sales of approximately $2.2 billion. Hence, a one percent increase in the price of domestic leather would result in a 1.6 percent (best estimate) increase in the volume of imported leather. This in turn would replace 0.26 percent of domestic production (1.6 x 0.16 = 0.26 percent).

1/ Estimates are based on data for 1981 in TCA, U.S. Leather Industry Statistics, 1982 edition, pp. 14-31.

2/ 1977 Census of Manufactures, overall average for men's, women's and N.E.C. shoe manufacturing sectors.

The fourth effect is the decline in leather exports. Again, we must use a proxy, thus, we will use the leather import elasticity of -1.6 (best estimate). The U.S. exports $275 million worth of leather or 13 percent of domestic production. A one percent in the price of leather would decrease exports by 1.6 percent. As a result, a one percent increase in the price of leather would then decrease demand for domestic production by 0.21 percent (1.6 x 0.13 = 0.21 percent).

In summary (using best estimates), a one percent increase in the price of leather will decrease demand for domestically produced leather by 0.89 percent:

	Effect on domestic producers Percent
Imports of shoes	-0.28
Imports of leather goods	-0.14
Imports of leather	-0.26
Impacts on leather exports	-0.21
Total effects	-0.89

Similar calculations show that, using the low and high elasticities, the reduction in domestic leather production resulting from a one percent increase in leather prices would range from 0.35 to 1.46 percent.

4. Supply of Leather

The United States leather supply originates from two general sources--domestic tanneries and foreign tanneries. While the domestic tanneries supply most of the finished leather to U.S. leather product manufacturers, the foreign tanneries predominately supply their leathers to foreign manufacturing firms which, in turn, compete with U.S. leather product manufacturing firms for the finished leather goods markets. In this section of this report, the discussion emphasizes the supplies of leather available to U.S. leather manufacturing firms. The discussion of the importation of finished leather products into the U.S. is presented in the next section of this chapter.

While the ability of the U.S. leather tanning industry to meet the demand for leather could be restricted by the availability of hides or skins, it generally has been able to respond to the domestic demand for leather. Historically, U.S. tanneries have been able to purchase all the necessary hides to meet their forecasted demands although often not at a price they would prefer. In recent years, however, the expanding percentage of exported U.S. cattlehides, which in 1979 had reached 70 percent of total commercial slaughter, has become a problem of major concern to domestic tanners and leather products manufacturers. The export restrictions that many developing countries have placed on the access to their indigenous raw material supplies, in order to promote growth in their own tanning and leather products industries, have helped to increase the demand for the freely-traded U.S. produced cattlehides.

As will be discussed in a later section of this chapter, while the total U.S. supply of hides available for tanning had been increased steadily, reaching 41,856 million head of cattle in 1977, in 1978 the supply began to decline and had dropped to an estimated 33.6 million in 1979. Shown in Table V-5 are the U.S. leather tanning industry's annual production data from 1955 to 1981. The industry's output has steadily declined throughout this period, falling from 37.2 million equivalent hides in 1955 to a low of 17.6 million in 1980 and increasing to 19.2 million in 1981.

B. Imports of Finished Leather Products into the United States

The United States is the world's largest importer of leather products, with Germany, the United Kingdom, and Switzerland following in that order. Importers have realized the United States is an attractive market for foreign leather products and the market has been expanding at a rapid rate. As a result, importers of leather goods into the U.S. have been growing at an accelerating rate to create what some industry experts perceive as a serious threat to the domestic tanning and leather goods industries.

This trend has also occurred in other developed countries. In Germany, Sweden, and in other countries, leather imports have reduced their respective leather tanning and leather products industries to a fraction of their former size. The exact reasons for this shift are many and complex. Basically, the leather industry is labor intensive and developing countries have certain cost advantages. Second, because the industry does not require a high level of technology, it can be adapted to developing countries. Third, a complicated series of trade restrictions prohibit the U.S. tanning and leather products industries from competing favorably in foreign markets. Fourth, developing countries such as Korea, Taiwan, and Brazil see in this industry's development a valuable source of badly needed foreign exchange and as a result, they encourage its development. The following sections discuss the trends in U.S. imports of leather products and the factors affecting the foreign trade of leather and leather products.

1. Trends in Imported Leather Goods

Table V-6 presents the U.S. foreign trade in leather products. The value of imports have more than tripled from 1969 to 1981, increasing from $631 million to over $3.78 billion in 1981. The value of exports during this period increased rapidly, but in 1979 they amounted to only $269 million or only 7.1 percent of all leather imports.

Footwear, the major product imported into the U.S. accounted for two-thirds of total leather product imports in 1981, approximately the same proportion of total imports as in 1971. Leather wearing apparel made rapid increases from 1972-1978 in its proportion of total imports and was the second most important imported leather product in 1978. In 1979, imports declined and leather wearing apparel imports fell behind handbags and luggage. Handbags and luggage now make up the two most important categories with imports of $399 million and $385 million, respectively, in 1981.

Table V-5. The tanning industry production, cattlehide equivalents, 1955-1981

Year	1,000 cattlehide equivalents	% change from previous year
1955	37,220	--
1956	36,810	-1.1
1957	35,820	-2.7
1958	33,810	-5.6
1959	34,090	+0.8
1960	31,850	-6.6
1961	32,226	+1.2
1962	31,596	-2.0
1963	31,325	-0.9
1964	32,187	+2.8
1965	32,697	+1.6
1966	32,252	-1.4
1967	30,861	-4.3
1968	31,884	+3.3
1969	28,388	-10.9
1970	25,941	-8.6
1971	25,267	-2.6
1972	24,661	-2.4
1973	21,062	-14.6
1974	19,998	-5.0
1975	21,894	+9.5
1976	23,526	+7.5
1977	21,528	-8.5
1978	20,199	-6.2
1979	18,170	-10.0
1980	17,600	-3.1
1981	19,189	+9.0

average annual change from 1955 to 1979 equals -2.8%.

1972-81
-2.8%

Source: Tanners' Council of America, "Membership Bulletin Leather Industry Statistics."

Table V-6. United States foreign trade in leather products

Year	Imports							
	Footwear1/	Wearing apparel	Handbags & purses**	Luggage & flat goods***	Other products	Total imports	Total exports	Exports as a percent of imports
	$1,000							(%)
1969	435,884	19,674	58,420	38,393	78,643	631,014	33,984	5.4
1970	559,347	38,233	62,974	41,366	87,282	789,202	35,732	4.5
1971	678,352	59,251	67,606	49,758	74,188	929,155	36,987	4.0
1972	832,652	91,773	83,623	76,795	83,561	1,168,404	43,756	3.7
1973	976,106	109,728	108,211	100,231	94,380	1,388,656	55,037	4.0
1974	980,668	123,066	106,853	95,890	106,723	1,413,200	79,754	5.6
1975	1,132,228	154,263	124,776	89,486	94,343	1,595,096	88,852	5.6
1976	1,448,561	236,587	185,000	160,754	140,086	2,170,988	110,904	5.1
1977	1,599,170	204,135	207,247	190,283	186,259	2,387,094	119.501	5.0
1978	2,057,351	318,269*	310,382	266,184	240,917	3,193,103	141,004	4.4
1979	2,429,284	257,955*	299,806	295,557	281,187	3.563,789	188,894	5.3
1980	2,298,308	107,907*	350,562	321,789	295,789	3,437,355	257,432	13.4
1981	2,480,984	207,067*	399,299	384,675	306,112	3,788,137	269,346	7.1

1/ Other than rubber.
* No direct comparison can be made with previous years due to category description change as of 1 March 1977.
** Includes leather, vinyl and other materials.
*** Includes leather and other materials.
Source: Tanners' Council of America.

Latin American countries appear to have good access to the U.S. market with Mexico, Columbia, and Brazil regularly exporting certain types of leather goods. Lebanon, Morocco, Yugoslavia and Hong Kong are developing countries outside Latin America which regularly export certain types of leather goods to the United States. Some other developing countries have also begun to emerge as suppliers. For example, Israel, the Republic of Korea, and Taiwan have recently become important exporters of leather products to the U.S. Within the shoe market, Spain and Italy have been large exporters to the U.S.

While much of the historical data reflect U.S. imports of finished leather products, a recent trend is emerging of shipping crust leather to the U.S. According to industry sources, much of this is coming from Argentina and it has been offered at prices very near the U.S. price for untanned hides. While it has been reported that some of this crust leather is of lower quality, several U.S. tanners are considering the purchase of it for retanning purposes.

2. Trade Restrictions

One of the major restrictions of the U.S. leather tanning industry is that, although foreign sources have free access to U.S. raw hides and skins, U.S. tanners have traditionally been denied equal access to foreign leather markets. Since representatives of the U.S. leather industry feel current and past trade legislation and duties have not been effective in controlling U.S. imports of leather and leather products, they have not favored any further cuts in U.S. duties on competitive imports. The following sections of this report offer an overview of some of the tariffs and trade legislation which has and/or could affect the industry. The discussions of tariff structures and non-tariff barriers described below were largely taken from the report, Leather and Leather Products, which was published by the United Nations in 1971 and reflects tariff status after the Kennedy Round of trade negotiations.

Tariff Structures. Tariffs tend to increase as the degree of processing or the manufacturing content of an article increases. The leather industry is a fairly good example of this as in most countries raw hides and skins can be imported duty free, while finished leather carries a tariff of about 5 to 10 percent of the imported value of the leather, and leather footwear and other finished leather articles carry tariffs between 10 and 25 percent.

The Kennedy Round negotiations for leather and leather products resulted in only modest tariff reductions. As mentioned above, since hides and skins were already free of duty in most developed market-economy countries, no reductions were called for. Tariff rates for pre-tanned leather were not reduced much, except in the U.S., and the concessions made by the EEC and Japan were confined to goat, sheep, and exotic leathers. In the case of finished leather, the U.S. effectively halved its rates, the United Kingdom made somewhat smaller concessions, EEC made smaller concessions still, while Japan made only a few concessions and those mainly for the more exotic leathers.

More significant reductions in tariffs were agreed on for footwear and leather products. The EEC tariff on footwear was halved, from 16 percent to 8 percent, while the United Kingdom tariffs, in general, were also halved. In the U.S., somewhat smaller reductions were conceded, but Japan made no concessions, maintaining its tariff at 27 to 30 percent, the highest tariff to be found in the post-Kennedy Round rates for leather and leather products.

Non-Tariff Barriers. Apart from tariffs, imports of leather and leather products are also subject to other restrictions of various kinds in a few developed market-economy countries. For example, Japan has the most elaborate set of restrictions on imports of leather and leather goods, and appears to be the only developed country with import restrictions on leather itself, as distinct from goods manufactured from leather. Japan also has restrictions on footwear, as have two other developed countries, Ireland and Norway. Australia restricts imports of leather clothing.

In general, therefore, only a few countries operate non-tariff barriers against leather and leather goods; indeed, in Western Europe and North America such restrictions are negligible. In Japan, a fairly complex set of restrictions reinforces the relatively high tariff rates noted in the previous section, and the effects of these two barriers, operating simultaneously, must reduce the level of imports of leather and leather goods into Japan.

Effect of Current Legislation. Past trade legislation and trade duties have generally not been effective in curtailing U.S. imports of leather and leather products. As such, industry leaders have stepped up lobbying efforts for more effective tariff rates and the initiation of trade restrictions.

One such effort was initiated in August, 1977, when the Tanner's Council of America filed a complaint with the Office of Special Representative for Trade Negotiations (STR) under Section 301 of the Trade Act of 1974. The complaint alleged that Japan had maintained quantitative restrictions and excessive tariffs that adversely affected U.S. exports of leather to Japan. The Tanner's Council claimed that such restrictions unfairly limited access to Japanese leather markets. As a result of the Tanners' Council complaint, early in 1979, the U.S. Government announced it had achieved an "understanding" with Japan that would increase U.S. leather exports to that nation. The "understanding" eased Japanese quota restrictions against U.S. leather to the extent that up to $30 million in new sales may be forthcoming compared to the $1.5 million worth of products U.S. tanners sold to Japan in 1978. 1/

1/ "Japan, U.S. in Accord on Leather," Daily News Record, March 13, 1979.

The domestic shoe industry, after working for nearly fifteen years to gain government recognition of its serious import problem, late in 1977 gained a positive stimulus to domestic producers when the U.S. Government completed negotiations of Orderly Marketing Agreements (OMA's) with the Republic of China (Taiwan) and Korea. These OMA's were designed to restrain the exports of nonrubber footwear to the U.S. market by those two countries by allowing only specified quantities until 1981. In 1979, although imports from Taiwan and Korea remained stable, uncontrolled countries' imports to the U.S. increased dramatically, giving leather imports an increasing share of the U.S. market. The nonrubber footwear imports reached 400 million pairs in 1979, with Italy accounting for 80 percent of the 40.7 million pair increase between January-August 1978 and 1979. Imports from the Philippines jumped 112 percent in quantity, Thailand imports rose 99 percent and Singapore shipments were up 1,307 percent. Imports from some South American countries also rose substantially, El Salvador, 618 percent and Brazil, 32 percent.

Other efforts by the leather and leather products industries to reduce imports have included those to obtain countervailing duties against specific leather products from countries whose export manufacturers receive government subsidies on export products. While the overall effectiveness of countervailing duty actions may or may not be great, their award does reassure the U.S. industries that their efforts are not in vain.

C. The Raw Hide Market

Cattlehides and sheep skins are the primary raw materials used in the leather tanning industry and, for the most part, are a by-product of the meat packing industry. As the value of a raw cattlehide traditionally represents only 3 to 6 percent of the value of the live animal, the supply of hides is highly inelastic, i.e., neither hide prices nor demand has substantial influence on the total supply of hides. Hide prices and demand will, however, affect the destination of the raw hides.

Historically, some U.S. hides have always been exported to foreign tanners. Over the past decade, however, demand has increased significantly, and the international trade of raw hides has become a predominant influence on raw hide prices. For example, in 1976, for the first time, over half of the U.S. produced cattlehides were exported to foreign tanneries and substantially affected the domestic prices of hides. By 1981, 55 percent of total U.S. commercial slaughter was being exported. Thus, the broad international setting must be considered to understand the price of raw hides as well as the price of leather and leather products.

1. United States Supply of Hides

The supply of U.S. cattlehide has followed the cattle cycle which normally lasts 10 years with the expansion phase lasting 6-7 years and the liquidation phase lasting 3-4 years. 1/ The last cycle began in 1967-68

1/ DPRA and Schnittker Associates, "United States Production, Consumption Trade and Stocks of Tallow/Grease, Lard, and Animal Protein Meals--Estimates and Projections". Completed for the USDA Foreign Agricultural Service, Washington, D.C. 1980.

with the cattle on farms expanding to 1975 following by four years of liquidation. The current cycle began in 1980 with an increase in cattle numbers on farms which is continuing through 1982. In 1955, 26 million cattle were slaughtered commercially in the U.S., including 19 million which were slaughtered as Federal Inspected Slaughter (F.I.S.) and an additional 7 million which were slaughtered in other commercial establishments (Table V-7). [1] During the 60's the number grew rapidly as the cattle feeding industry greatly increased the total U.S. capacity over the previously grass-fattened production. By 1970, the number of slaughtered cattle increased to 35.0 million, stabilized for the next few years, and then increased to 42.6 and 41.9 million head in 1976 and 1977, respectively, as the large buildup of cattle on feed was reduced. A decline in slaughter began in 1978 with a 5.5 percent drop from 1977, to 39.5 million head and continued into 1979 with a slaughter of 33.7 million head.

Total slaughter in 1980 and 1981 was 33.8 and 35.0 million head, respectively. Slaughter numbers are expected to increase steadily to 1988-1989 when the present cattle cycle is expected to peak out at about 42-44 million head. [2]

A further indication that herd expansion has begun is the 1979 calf slaughter which declined a substantial 32 percent to 2.8 million skins.

The supply of cattlehides for domestic tanning production further tightened in 1979 because hide exports remained high and supply dropped sharply. Net exports as a percentage of total slaughter jumped from 60 percent in 1978 to 67 percent in 1979 and then declined to 52 percent in 1981.

The expanding percentage of cattlehides exported has been a major concern to domestic tanners and leather products manufacturers. Restrictions that many cattle-producing countries place on access to their raw material supplier in order to foster the growth of their own tanning and leather products industry (and provide much needed jobs and a source of foreign currency) have increased the worldwide demand for freely-traded U.S. cattlehide (see Part 4 of this chapter for a discussion of trade restrictions in raw hide supply).

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[1] Federal Inspected Slaughter means that the animal is slaughtered and processed in a slaughterhouse and inspected and identified by federal meat inspectors to allow the meat to be sold interstate.

[2] DPRA, United States Production, Consumption Trade and Stocks of Tallow/Grease, Lard and Animal Protein Meals - Estimates and Projections. Completed for the U.S. Department of Agriculture. April 1980.

Table V-7. Annual cattle slaughter in the United States, 1955-1979 (1,000 head)

	Breakdown of federally inspected slaughter							
	Cows & heifers	% Total	Steers	% Total	Bulls & stags	% Total	Total F.I.S.	Total commercial slaughter
1955	9,330	48.9	9,299	48.8	427	2.3	19,056	25,723
1956	9,460	46.9	10,311	51.1	415	2.0	20,186	26,862
1957	9,031	46.4	10,018	51.5	404	2.1	19,453	26,232
1958	7,509	42.6	9,840	55.8	293	1.6	17,642	23,555
1959	7,538	43.2	9.681	55.4	241	1.4	17,460	22,931
1960	8,567	44.2	10,557	54.4	272	1.4	19,396	25,224
1961	8,554	42.8	11,164	55.9	250	1.3	19,968	25.635
1962	8,670	42.6	11,447	56.3	222	1.1	20,339	26,083
1963	8,964	41.4	12,496	57.7	202	0.9	21,662	27,231
1964	10,452	41.6	14,395	57.3	286	1.1	25,133	30.818
1965	12,712	47.8	13,488	50.7	413	1.5	26,613	32,347
1966	13,055	47.8	13,846	50.7	418	1.5	27,319	33,725
1967	12,710	45.8	14,676	52.8	384	1.4	27,780	33,869
1968	13,771	46.5	15,361	51.9	460	1.6	29,592	35,026
1969	14,284	46.8	15,754	51.6	499	1.6	30,537	35,237
1970	13,677	44.4	16,608	53.9	508	1.7	30,793	35,025
1971	13,856	44.1	17,003	54.1	560	1.8	31,419	35,585
1972	13,932	43.2	17,737	55.0	581	1.8	32,250	35,774
1973	13,293	43.6	16,591	54.0	611	2.0	30,521	33,687
1974	14,755	44.3	17,824	53.5	740	2.2	33,319	36,811
1975	19,838	53.8	16,071	43.5	995	2.7	36,904	40,900
1976	20,815	53.4	17,270	44.3	907	2.3	38,992	42,644
1977	19,994	51.6	17,891	46.2	832	2.2	38,717	41,856
1978	18,894	51.1	17,308	46.9	746	2.0	36,948	39,552
1979	14,659	46.5	16,258	51:6	587	1.9	31,504	33,678
1980	14,903	47.1	16,060	50.8	678	2.1	31,641	33,806
1981	15.653	47.7	16,437	50.1	728	2.2	32,818	34,954

Source: U.S. Department of Agriculture.

Recent action in the international trade area is of interest at this point. In September 1978, skyrocketing hide prices had substantially increased tanners' requirements for working capital, and the tanning industry was urging the U.S. Government to provide relief through negotiating access to other countries' raw material. Leather products industries were urging imposition of export controls on U.S. cattlehides. With the leadership of the American Footwear Industries Association (AFIA) and the Tanner's Council of America (TCA), 20 trade and professional associations joined the Hide Action Program (HAP) Task Force. The legislation HAP sought was an amendment to the Export Administration Act and would have permitted the President to impose export controls on cattlehides when the number exported reached 56 percent of U.S. production or when other raw material producing countries denied U.S. access to hides and skins. The legislation was strongly opposed by the hide and skin, cattle, and meat packing interests and in August and September 1979, both the Senate and the House of Representatives defeated it by narrow margins.

In October 1979, the U.S. and Argentina reached an agreement that eliminated the Argentine export embargo on cattlehides, replacing it with an export tax to be gradually phased out. This was an attempt to negotiate for access to another country's raw material supply. However, Argentina has not phased out the export tax.

Total cattlehide movement to U.S. tanners has been decreasing over the past ten years as U.S. tanners and the U.S. shoe industry have met stiff international competition and restrictive trade legislation. Total wettings of domestic tanneries decreased from 23.6 million hides or 66.8 percent for the U.S. total cattlehide production in 1966, to 17.6 million hides or 46.5 percent in 1974. Total wetting increased in 1975 and 1976 to 19.1 million and 20.4 million, respectively. These levels represented 46 and 47 percent of the total U.S. cattlehide production in those two years (Table V-8). Between 1977 and 1981, wettings fluctuated between 14.8 and 18.6 million hides.

Supplies of other types of leather making raw materials have not shown the same trends as have cattlehides. Prior to 1974 calfskin supplies had been shrinking drastically in the U.S. Calfskin production in 1976 was estimated at 4.5 million skins, a 40 percent rise above 1979 production of 3.2 million skins. As farmers and ranchers began to hold back calves and herd rebuilding began, calfskin production declined in 1978, and dropped to 2.8 million skins in 1979, of which 93 percent or 2.6 million were exported.

Sheep and lamb skins, the only other major source of hides and skins in the U.S., have been declining steadily in the U.S. over the past two decades. Although the numbers are responsive to price developments in meat and wool, the long-term prospect for domestic sheepskins is declining.

Production amounted to an estimated 11.7 million sheepskins in 1975, and subsequently has declined to 4.8 million by 1979. Of that amount, 2.4 million or 50 percent were exported.

Table V-8. Movement into sight of cattlehides, expressed in number (1,000 hides) and as a percent of total estimated slaughter 1/

Year	Estimated total slaughter	Exports and Re-Exports		Imports		Net Export		Total Movement to Tanners	
		number	percent	number	percent	number	percent	number	percent
1966	35,260	14,205	40.3	221	0.6	13,984	39.6	23,572	66.8
1967	35,381	11,866	33.5	232	0.6	11,634	32.9	23,607	66.7
1968	36,076	12,853	35.6	494	1.4	12,359	34.2	23,617	65.5
1969	36,118	14,790	40.9	277	0.7	14,513	40.2	21,096	58.4
1970	35,740	15,229	42.6	385	1.1	14,844	41.5	20,199	56.5
1971	36,280	15,969	44.0	275	0.7	15,694	43.2	20,189	55.6
1972	36,480	17,584	48.2	292	0.8	17,292	47.4	19,218	52.7
1973	34,700	16,871	48.6	694	2.0	16,177	46.6	17,733	51.1
1974	37,700	18,444	48.9	520	1.4	17,924	47.5	17,536	46.5
1975	41,800	21,287	50.9	958	2.3	20,329	48.6	19,067	45.6
1976	43,582	25,280	58.0	962	2.2	24,318	55.8	20,397	46.8
1977	42,770	24,501	57.3	932	2.2	23,569	55.1	18,616	43.5
1978	40,404	24,805	61.4	704	1.7	24,101	59.7	17,329	42.9
1979	34,400	23,736	69.0	673	2.0	23,073	67.0	14,999	43.6
1980	34,520	19,520	56.5	880	2.5	18,640	54.0	14,816	42.9
1981	35,640	19,729	55.4	1,028	2.9	18,701	52.5	15,461	43.4

1/ It should be noted net exports plus total movements to Tanners do not necessarily equal total estimated slaughter. This is accounted for by the fact that not all slaughtered animals produce useable hides as well as the fact that some hides may move to tanners before they are exported.

Source: Tanner Council of America "Membership Bulletin Leather Industry Statistics", 1982.

2. World Supply of Hides and Skins

World cattle numbers were increasing prior to 1976, but drought in many countries and unfavorable prices in key countries have since caused cattleherd reductions. World cattle numbers peaked in 1976 at 963 million. The total number in 1980 was expected to be 949 million (Table V-9).

Of countries whose data are reported, the U.S.S.R. is the largest cattle producer, accounting for about 12.1 percent of the world production. The U.S. is second by a small margin with about 11.7 percent. India has more cattle, but as they are not slaughtered, no major hide production occurs.

A more meaningful number depicting supply is the total hides produced by country as shown in Table V-10. As estimated by the Foreign Agriculture Service, total hide production in the 1966-1970 period averaged 176 million hides per year. This decreased slightly over the next few years as slaughter rates declined, but increased sharply in the 1974-1977 period reaching 203 million hides in 1977. A decline over the next two years brought production to an estimated 189 million in 1979.

According to the FAS data, the U.S.S.R. is clearly the leader in hide production with a reported 37.9 million estimated take offs in 1979; however, since this estimate includes death losses, it is probably overstated by 6-8 million hides (hides from animals which die in the field are often not useable for tanning). When such an adjustment is made, the FAS estimate of hide production is in line with the estimate prepared by the Tanners' Council (Table V-7). The U.S. is about the same with 37.0 million hides. Argentina and Brazil produced an estimated 15.3 and 10.6 million hides in 1979. It is interesting to note that, although Brazil has an estimated 90 million head of cattle compared to Argentina's 60 million, Argentina produces a higher number of hides because of the low quality and low slaughter rate of many Brazilian herds.

Australian hide production has fluctuated widely from a low of 5.8 million during the 1966-70 period to a high of 12.7 million in 1977, reflecting Australia's volatile cattle market which depends on the fluctuating international beef market.

3. The Demand for Raw Hides

Earlier sections of this study examined the demand placed on the U.S. tanners for leather and leather products, a demand which results in that for raw hides. Since U.S. tanners must compete directly with foreign buyers for the livestock slaughter industry's by-product hides, this section will consider that international demand.

The percentage of U.S. raw hides exported has increased steadily over the past two decades even though the actual number of hides exported has not changed significantly. The total international supply has been restricted by trade practices and, accordingly, the U.S. leather tanning industry has been gradually losing its market share to foreign shoe and leather-goods

Table V-9

CATTLE AND BUFFALO: NUMBERS IN SPECIFIED COUNTRIES - AVERAGE 1971-1975, ANNUAL 1976-80

(IN THOUSAND HEADS)

REGION AND COUNTRY	AVERAGE 1971/75	1976	1977	1978	1979	1980 1/
NORTH AMERICA:						
CANADA	12,983	14,048	15,710	12,870	12,328	12,400
COSTA RICA	1,696	1,861	1,920	2,002	2,069	2,165
DOMINICAN REPUBLIC	1,600	1,950	2,000	2,050	2,150	2,153
EL SALVADOR	1,074	1,110	1,162	1,236	1,294	1,354
GUATEMALA	1,816	2,148	2,270	2,417	2,580	2,700
HONDURAS	1,641	1,715	1,770	1,838	2,245	2,245
MEXICO	27,033	28,900	29,300	29,700	29,300	30,100
NICARAGUA	2,299	2,600	2,686	2,774	2,846	2,525
PANAMA	1,305	1,361	1,374	1,395	1,454	1,537
UNITED STATES	122,759	127,980	122,818	116,375	110,864	110,961
TOTAL NORTH AMERICA	174,207	183,653	181,002	172,657	167,130	168,140
SOUTH AMERICA:						
ARGENTINA	54,781	61,469	61,891	61,825	60,174	59,568
BRAZIL	87,080	92,000	91,000	89,000	90,000	93,000
CHILE	3,196	3,389	3,407	3,492	3,550	3,600
COLOMBIA	21,964	23,825	24,335	25,218	26,137	27,151
ECUADOR	2,461	2,793	2,875	2,767	2,532	2,231
PERU	4,048	4,260	4,300	4,350	4,100	4,000
URUGUAY	10,071	10,398	9,843	9,424	9,613	10,480
VENEZUELA	8,923	9,546	9,933	9,951	10,160	10,363
TOTAL SOUTH AMERICA	192,524	207,680	207,584	206,027	206,266	210,370
EUROPE:						
WESTERN:						
EC:						
BELGIUM/LUXEMBOURG	2,981	3,011	3,022	3,030	3,085	3,050
DENMARK	2,900	3,055	3,066	3,055	3,052	3,030
FRANCE	22,854	23,641	23,334	23,360	23,507	23,625
GERMANY, FEDERAL REP. OF	14,070	14,493	14,496	14,763	15,007	14,900
IRELAND	5,955	6,214	6,210	6,246	6,132	6,218
ITALY	8,596	8,529	8,813	8,568	8,724	8,850
NETHERLANDS	4,238	4,606	4,528	4,673	4,797	4,700
UNITED KINGDOM	13,758	13,915	13,667	13,523	13,507	13,509
TOTAL EC	75,351	77,464	77,134	77,218	77,811	77,882
AUSTRIA	2,537	2,500	2,502	2,547	2,594	2,580
FINLAND	1,737	1,702	1,661	1,657	1,644	1,644
GREECE	1,101	1,179	1,116	1,035	973	950
NORWAY	943	901	944	964	985	1,002
PORTUGAL	1,194	1,080	1,100	1,115	1,050	1,110
SPAIN	4,358	4,408	4,538	4,601	4,650	4,625
SWEDEN	1,868	1,863	1,879	1,892	1,911	1,923
SWITZERLAND	1,902	2,005	2,095	2,024	2,038	2,038
TOTAL WESTERN EUROPE	90,993	93,102	92,879	93,053	93,656	93,754
EASTERN:						
BULGARIA	1,402	1,725	1,790	1,735	1,762	1,785
CZECHOSLOVAKIA	4,445	4,555	4,654	4,758	4,887	4,900
GERMANY, DEMOCRATIC REP. OF	5,386	5,532	5,471	5,549	5,572	5,600
HUNGARY	1,927	1,904	1,887	1,949	1,966	1,953
POLAND	11,434	12,762	12,000	12,359	12,409	12,360
ROMANIA	5,678	6,126	6,351	6,306	6,511	6,600
YUGOSLAVIA	5,441	5,755	5,641	5,542	5,491	5,367
TOTAL EASTERN EUROPE	35,803	38,359	37,794	38,198	38,598	38,565
TOTAL EUROPE	126,796	131,461	130,673	131,251	132,254	132,319
SOVIET UNION	104,211	111,034	110,346	112,690	114,086	115,000
AFRICA:						
SOUTH AFRICA	11,527	12,774	13,060	13,135	13,319	12,961
TOTAL AFRICA	11,527	12,774	13,060	13,135	13,319	12,961
ASIA:						
REPUBLIC OF CHINA (TAIWAN)	254	249	249	250	260	275
INDIA	236,990	240,500	241,490	242,690	242,500	241,000
IRAN	6,718	7,250	7,400	7,500	7,800	7,200
ISRAEL	267	323	333	324	280	251
JAPAN	3,609	3,723	3,875	4,009	4,120	4,250
REPUBLIC OF KOREA	1,473	1,642	1,554	1,618	1,787	2,003
PHILIPPINES	5,981	4,462	4,620	4,779	4,653	4,646
TURKEY	14,061	14,802	15,158	15,552	15,964	16,200
TOTAL ASIA	269,354	272,951	274,679	276,722	277,364	275,825
OCEANIA:						
AUSTRALIA	28,896	33,434	31,533	29,379	27,107	26,164
NEW ZEALAND	9,150	9,777	9,472	9,129	8,400	8,300
TOTAL OCEANIA	38,046	43,211	41,005	38,508	35,507	34,464
TOTAL SELECTED COUNTRIES	916,664	962,764	958,349	950,990	945,926	949,079

NOTE: VARIOUS DATES OF ENUMERATION ARE USED BY THE COUNTRIES REPORTING ANIMAL NUMBERS. THIS TABLE CLASSIFIES THIS DATA AS CLOSE TO JANUARY 1 AS POSSIBLE

1/ PRELIMINARY.

SOURCE: PREPARED OR ESTIMATED ON THE BASIS OF OFFICIAL STATISTICS OF FOREIGN GOVERNMENTS, OTHER FOREIGN SOURCE MATERIALS, REPORTS OF U.S. AGRICULTURAL ATTACHES AND FOREIGN SERVICE OFFICERS, RESULTS OF OFFICE RESEARCH, AND RELATED INFORMATION.

FEBRUARY 1980

DAIRY, LIVESTOCK & POULTRY DIVISION
Commodity Programs, FAS, USDA

Table V-10

CATTLE: SLAUGHTER IN SPECIFIED COUNTRIES - AVERAGE 1971-75, ANNUAL 1976-80

(IN THOUSAND HEADS)

REGION AND COUNTRY	AVERAGE 1971/75	1976	1977	1978	1979[1/]	1980[2/]
NORTH AMERICA:						
CANADA	4,293	5,420	5,321	4,724	4,100	3,880
COSTA RICA	237	307	372	405	407	417
DOMINICAN REPUBLIC	205	234	220	225	215	228
EL SALVADOR	166	188	196	221	228	250
GUATEMALA	353	366	417	473	516	557
HONDURAS	272	309	301	350	360	370
MEXICO	4,359	5,400	5,731	6,200	6,100	6,200
NICARAGUA	300	370	383	453	513	542
PANAMA	203	241	240	216	201	255
UNITED STATES	32,829	48,726	48,073	44,272	37,080	35,500
TOTAL NORTH AMERICA	43,219	61,561	61,254	57,839	49,640	48,166
SOUTH AMERICA:						
ARGENTINA	10,311	13,868	14,748	16,449	15,300	14,500
BRAZIL	10,680	11,300	12,500	11,200	10,650	10,400
CHILE	631	904	765	712	780	800
COLOMBIA	2,607	3,059	2,937	3,100	3,288	3,460
ECUADOR	328	383	470	510	553	569
PERU	742	660	680	709	710	700
URUGUAY	1,495	2,050	1,730	1,605	1,315	1,500
VENEZUELA	1,316	1,445	1,427	1,566	1,620	1,652
TOTAL SOUTH AMERICA	28,111	33,669	35,257	35,922	34,196	33,581
EUROPE:						
WESTERN:						
EC:						
BELGIUM/LUXEMBOURG	1,100	1,093	1,059	1,024	1,081	1,055
DENMARK	990	1,118	1,117	1,053	1,100	1,100
FRANCE	7,566	8,092	7,563	7,496	7,959	8,317
GERMANY,FEDERAL REP.OF	5,234	5,416	5,237	5,316	5,640	5,400
IRELAND	1,137	1,296	1,457	1,469	1,430	1,430
ITALY	4,872	4,632	4,783	4,685	4,850	4,950
NETHERLANDS	1,856	2,012	2,027	1,965	1,900	1,900
UNITED KINGDOM	4,192	4,464	4,116	3,960	3,790	3,670
TOTAL EC	26,955	28,123	27,359	26,968	27,750	27,822
AUSTRIA	775	791	737	752	794	800
FINLAND	735	685	632	617	600	605
GREECE	538	619	536	504	475	470
NORWAY	392	328	340	342	356	360
PORTUGAL	418	385	346	428	418	410
SPAIN	1,777	1,855	1,882	1,775	1,760	1,730
SWEDEN	680	708	683	667	672	678
SWITZERLAND	785	832	829	825	870	880
TOTAL WESTERN EUROPE	33,055	34,326	33,344	32,878	33,695	33,755
EASTERN:						
CZECHOSLOVAKIA	1,531	1,503	1,450	—	1,600	1,600
HUNGARY	400	457	400	480	455	486
POLAND	4,641	5,201	4,378	4,502	4,623	4,597
YUGOSLAVIA	2,041	2,558	2,548	2,504	2,560	2,506
TOTAL EASTERN EUROPE	8,612	9,719	8,776	7,486	9,238	9,153
TOTAL EUROPE	41,667	44,045	42,120	40,334	42,933	42,908
SOVIET UNION	28,407	38,191	36,433	37,642	37,900	38,400
AFRICA:						
SOUTH AFRICA	2,678	2,563	2,693	2,985	3,200	3,150
MOROCCO	798	683	660	650	660	660
TOTAL AFRICA	3,476	3,246	3,353	3,635	3,860	3,810
ASIA:						
REPUBLIC OF CHINA(TAIWAN)	31	46	81	75	77	81
INDIA	1,673	1,711	1,723	1,737	1,750	1,780
IRAN	668	825	1,065	1,100	—	—
ISRAEL	89	106	121	145	118	100
JAPAN	1,148	1,023	1,198	1,263	1,240	1,260
REPUBLIC OF KOREA	310	404	472	491	523	591
PHILIPPINES	808	739	756	880	860	920
TURKEY	2,808	3,317	3,117	2,787	2,670	2,500
TOTAL ASIA	7,536	8,171	8,533	8,478	7,238	7,232
OCEANIA:						
AUSTRALIA	7,606	11,434	12,700	12,346	9,955	8,500
NEW ZEALAND	2,975	3,868	3,570	3,596	3,202	2,950
TOTAL OCEANIA	10,581	15,302	16,270	15,942	13,157	11,450
TOTAL SELECTED COUNTRIES	162,997	204,185	203,220	199,492	188,924	185,547

1/ PRELIMINARY. 2/ FORECAST.

SOURCE: PREPARED OR ESTIMATED ON THE BASIS OF OFFICIAL STATISTICS OF FOREIGN GOVERNMENTS, OTHER FOREIGN SOURCE MATERIALS, REPORTS OF U.S. AGRICULTURAL ATTACHES AND FOREIGN SERVICE OFFICERS, RESULTS OF OFFICE RESEARCH, AND RELATED INFORMATION.

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DAIRY, LIVESTOCK & POULTRY DIVISION
Commodity Programs, FAS, USDA

manufacturers. In 1966, 40 percent of the cattlehides produced in the U.S. were exported and by 1979, net exports had increased to 67 percent when total hide production in the U.S. declined sharply. Exports as a percent of total production declined to 52 percent in 1981. Imports of hides increased to slightly over 1.0 million hides from foreign sources (primarily Canada) in 1981.

The rate at which the United States exports raw hides has increased is shown in Table V-11. In 1980, nearly one-third, 7.4 million, of the U.S. hides were exported to Japan, 2.7 million to Korea, and nearly 2.0 million to Mexico. It is significant to note the rapid increase in exports to Korea as they jumped from 411 thousand hides in 1972 to the 3.7 million reported for 1978. Other countries with rapid increases in U.S. hide purchases are Italy and Taiwan. The majority of the remainder of the increase in international demand for U.S hides is reflected in the hides shipped to other countries which doubled from 1972 to 1975, with an estimated 1.2 million hides exported in 1975, but then declined in recent years.

Argentina has traditionally been a major exporter of hides with an annual average of 8 to 8.5 million hides exported from 1966 to 1969. Its exports, however, declined sightly in 1970, and then sharply in 1972, to amount to only 1.3 million in 1972 as Argentina suffered production problems and attempted to completely internalize its hide industry and, eventually, export only finished leather products. In 1979, an agreement was reached between the U.S. and Argentina for elimination of Argentina's cattlehide export embargo which was replaced by a gradually fading export tax. Brazil also internalized its hide tanning industry and banned exports of raw hides to further reduce world supply by two million hides. Recently, Brazil has become an importer of raw hides and is now competing for raw hides on an international basis.

In summary, the industry is basically in a demand-pull situation for raw hides. Foreign demand for raw hides now takes approximately 55 percent of total U.S. produced cattlehides. Only the U.S., Canada and Australia remain as major raw hide exporters. Nearly all other historical exporters, such as India and Brazil, have internalized their leather tanning industries and no longer allow the export of raw hides. Argentina is the exception to this trend. Recently the U.S. has negotiated an agreement with Argentina that has eliminated the export embargo on cattlehides, replacing it with an export tax to be gradually phased out (Section C.1). It is too early at this time to assess the actual effect of this agreement on the World's exportable hide supply.

4. Trade Restrictions in Raw Hide Supply

The systematic restriction of hides and skins exports appears to be the trend in developing countries whose basic policies are to restrict exports of raw materials (hides and skins), and simultaneously encourage exports and restrict imports of manufacturered goods (leather and leather products). This is done by levying taxes on exports of raw hides and skins, imposing high tariffs and quotas on imports, and granting incentives for exports of manufactured goods.

Table V-11. Exports of cattlehides from the U.S. to countries of destination, 1972-1981

Country of Destination	Unit	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
United States:											
Japan	1,000 pcs.	7,769	7,596	7,199	7,760	9,356	8,419	8,789	7,396	7,476	7,512
Mexico	"	1,806	2,036	2,534	2,588	1,708	1,944	1,933	2,428	1,972	2,485
Korea, Republic of	"	411	908	1,535	2,543	3,270	3,538	3,663	2,528	2,653	3,579
Romania	"	1,200	1,006	1,781	1,226	1,651	1,472	1,942	1,317	1,046	680
Spain	"	854	620	643	1,009	957	897	1,008	892	112	394
Canada	"	1,121	905	907	958	1,057	842	1,028	1,244	1,046	1,212
Czechoslovakia	"	857	821	676	877	678	680	586	686	318	334
Poland	"	568	766	666	866	389	433	349	513	522	203
China, Republic of (Taiwan)	"	226	332	486	864	817	830	989	955	1,285	1,312
Italy	"	263	605	434	773	1,561	1,030	1,269	2,248	690	486
USSR	"	518	48	450	660	143	56	298	73	3	--
France	"	771	591	339	510	816	751	543	699	238	137
Germany, West	"	729	656	641	440	518	435	379	454	206	319
Hong Kong	"	68	98	161	381	253	196	110	117	215	134
Hungary	"	228	201	532	262	270	227	180	144	94	112
Netherlands	"	449	160	159	239	326	417	211	324	164	94
Yugoslavia	"	459	273	226	160	263	478	431	769	440	230
Israel	"	132	140	134	152	63	48	33	55	22	26
Turkey	"	42	66	79	102	12	9	--	--	--	--
United Kingdom	"	245	199	50	61	137	190	50	86	48	32
Chile	"	261	273	134	24	8	87	--	--	7	--
Other Countries	"	673	452	829	1,217	1,017	716	755	813	955	422
TOTAL		19,650	18,752	20,595	23,672	25,270	24,160	24,545	23,741	19,512	19,703

Source: USDA, Foreign Agricuilture Service, Foreign Agricultural Circular Livestock and Meat.

When raw hides and skins are converted into leather, their value increases more than two and a half times. Benefits, particularly for developing countries, are derived by restricting exports of raw hides and skins, by developing domestic tanneries and by increasing their export of the preferred semi-tanned leather. These advantages result from (1) the developing countries' relative inability to rapidly adapt to changing fashion markets and to develop the technological sophistication necessary to high quality finished product development and (2) the leather processing industry's inability in developed countries to attract and retain the labor supply necessary to the semi-skilled labor-intensive character of the primary leather processing production stages.

In a review of some of its more recent tariff legislation, such as the Kennedy Round, the U.S. Government has indicated that little change has been made in existing import-export patterns. An overview of the estimated effects of the Kennedy Round on tariff barriers dealing with raw hides and skins follows.

In 1968, one-third of the approximately $452.6 million raw hide and skin imports was supplied by developing countries to the four major import markets: the EEC, the United States, Japan, and the United Kingdom. Latin American countries, i.e., Argentina, Brazil, and Uruguay, were the suppliers for the main developing countries. Prior to the Kennedy Round, entrance into major market areas was duty-free, with the exception of the United Kingdom and the United States. The Kennedy Round negotiations abolished the tariffs in these market areas and resulted in duty-free access to all four major markets.

Almost one-half of the sheep and lambskin imports in 1968 were supplied by developing countries. The biggest importers were the EEC, the United Kingdom, and the United States, the latter of which was also an important supplier. The Kennedy Round improved access to the four major markets and "effective protection" of processing was reduced. Japan imposed relatively high duties and quantitative restrictions on some items. Also in 1968, eighty-seven percent of all goat and kid skins was supplied by developing countries. The major importers were the EEC, United Kingdom, United States, and Japan. The Kennedy Round resulted in improved market access and reduced the "effective protection" of major importers. Nominal duties still apply to some varieties of goat and kid leather. The resultant effect of these policies is that now only the United States, Canada, Australia and New Zealand remain as open markets for the purchase of raw goat and kid skins.

5. Quantitative Analysis of Hide Prices

An examination of the hide prices over the period of 1972 to 1979 shows that hide prices have fluctuated widely from a low of 13.6 cents per pound (heavy native steer hides average quarterly prices) in the 1st quarter of 1975, to a high of 88.6 cents per pound during the second quarter of 1979. Since that time, they have dropped to a low of 32 cents in May of 1980.

The supply of hides is predetermined by the number of cattle slaughtered. It is generally held that the price of hides in no way determines the number of cattle slaughtered, but that hide availability is determined by factors affecting the cattle cycle i.e., livestock prices, grain prices reproduction factors, etc. As a result, the supply of hides is inelastic and changes in supply and demand result in wide swings in hide prices.

Economic theory implies that price of hides is dependent on the supply of hides which is predetermined by other conditions, the price of competing products and product demand. Exports of U.S. hides also play an important role as foreign countries have been purchasing an increasing percentage of the U.S. hides produced (see Section C-1 of this chapter). The price paid by foreign countries is influenced not only by demand conditions for leather, but also by the respective dollar exchange rates. As the value of the dollar declines (as it did in 1979) relative to other currencies, buyers can afford to pay a higher U.S. dollar price. Fear of the dollar decline can also cause foreign buyers to shift out of dollars into commodities (hides) to preserve the value of their holdings.

A major difficulty in an analysis of hide prices results from the high correlation among the independent variables (explanatory variables). Because of this interdependence - technically called multicollinearity - it is difficult to obtain a stable relationship. The best relationship, which identified 71 percent of the variability in hide prices over 1972 through 1979 period using quarterly data, is shown below:

$$\frac{HP}{WPI} = 29.6 - .0031\ \begin{matrix}\text{Dom.}\\ \text{Supply}\end{matrix} + .0022\ \text{Exp.} - 28.6\ \frac{PVC}{WPI} + .039\ \begin{matrix}\text{Disp. Pers.}\\ \text{Income}\end{matrix} - 5.28D$$

where:
- HP = Heavy Nature Steer Hide Prices ($ per lb)
- Dom. Supply = Domestic Supply of Hides (1,000 hides), i.e. slaughter
- Exp. = Hide Exports (1,000 hides)
- PVC = Product Price Index for Polyvinylchloride, 1967 = 100
- Disp. Pers. Income = Disposable Personal Income, 1972 dollars
- WPI = Wholesale Price Index, all commodities, 1967 = 100
- D = Dummy Variable for 1974 - 4th quarter through 1975 - 1st quarter

All variables were statistically significant, with the possible exception of hide exports which is marginally significant. The calculated Durbin-Watson statistic (a test for serial correlation) is indeterminant.

Because of the significantly lower price for hides realized during the Arab oil embargo and subsequent disruptions to world trade patterns, a dummy variable was included to account for price disruptions during the last quarter of 1974 and first quarter of 1975. This improved the statistical fit slightly over a similar equation without the dummy variable.

One problem not overcome is the role of the polyvinylchloride price (PVC) (a leather substitute). According to economic theory, PVC price should be directly correlated with hide price. That is, as PVC prices increase, hide prices should move in the same direction. The variable used for PVC price is a general indicator of all PVC prices divided by the wholesale price index, and in this case has an inverse relationship with hide prices. Basically, PVC price is correlated with the petroleum price and use as a leather substitute would constitute only a small portion of its total use. When excluded from the equation, the R^2 drops from .69 to .49 with other variables maintaining approximately the same coefficients.

As a result of this analysis, we can conclude that a one percent increase (decrease) in the supply of hides will result in a decrease (increase) of 1.2 - 2.0 percent in the price of hides. The above equation results in a best estimate of price elasticity of 1.4. The level of exports also affects the real domestic price. From the above equation, the real price increase (decrease) resulting from an increase of one percent in hide exports is estimated at .2 percent.

Domestic hide prices are also influenced indirectly by the level of real disposable income. As incomes increase (decrease) consumers demand more (or less) leather goods as final end products. This change in final demand is reflected on hide prices as a derived demand. The above regression equation demonstrates that the price of hides is highly income elastic in that a one percent increase (decrease) in real income will increase (decrease) the price of hides by 1.67 percent.

Other variables which were used in the analysis, but were statistically excluded primarily because of the high level of correlation with other independent variables included: the exchange rate of U.S. dollars against leading foreign currencies, the index of leading indicators, the index of coincident indicators and the lagged exchange rate.

VI. REPRESENTATIVE MODEL TANNERIES

The leather tanning industry is comprised of 158 wet process tanneries which utilize variations of the basic tanning process to produce differentiated types of leather. As this chapter is concerned with the development of economic models representative of tanneries which could be affected by the imposition of effluent control guidelines, an attempt will be made to describe those models which, together, could typify most tannery operations in the United States. The use of models is necessary due to the large number of plants in the industry and the lack of available financial data for individual tanneries. These models have been developed from data obtained from the EPA surveys of industry members as well as from published sources. It should be noted that, for the existing direct dischargers, actual tannery data were obtained and analyzed for estimating plant closures. However, those direct discharger data have been aggregated into model plants for estimating other economic effects.

The model plants for both direct and indirect dischargers were based on industry conditions during the 1977 time period. The models were then updated to reflect sales and production levels of late 1979, with fourth quarter 1979 dollars and the industry's long term profit position. 1/ This was accomplished using both primary and secondary data sources. The model plants, as described in this chapter, are considered to be the "base case"; that is, reflecting industry conditions before compliance with the regulations.

A. Types and Sizes of Model Plants

Tanneries vary by operational and financial characteristics; thus, the models will not accurately depict the characteristics of each existing tannery. However, since the various existing tanneries can be grouped into general categories which reflect their processes and discharge methods, fairly accurate representative models can be developed. While the representative models may not correspond exactly to actual tanneries, they do reflect operational and financial characteristics similar to those of industry tanneries.

1/ Dollar sales were adjusted utilizing the Implicit Price Deflators, GNP, 1972=100. Profit rates have been revised relative to the 1979 report.

The subcategories of tanneries utilized in this analysis are described below:

Subcategory	Name/Description
1	Chrome Tan/Pulp--plants which process raw or cured cattle or cattle-like hides into finished leather by chemically dissolving the hair (hair pulp); tanning with chrome; and retanning and wet finishing.
2	Chrome Tan/Save--plants which process raw or cured cattle or cattle-like hides into finished leather by chemically loosening and mechanically removing the hair; tanning with chrome; and retanning and wet finishing.
3	Nonchrome Tan--plants which process cured or raw cattle (or similar) hides into finished leather by chemically loosening and mechanically removing the hair, tanning primarily with vegetable tanning, alum, syntans, oils, or other chemicals, and retanning and wet finishing.
4	Retan/Sides--plants which process previously unhaired or pickled sheepskins and tanned hides or splits into finished leather by retanning and wet finishing, including coloring, fatliquoring, and mechanical conditioning.
5	No Beamhouse--plants which process previously unhaired or pickled sheepskins or cattlehides into finished leather by tanning with trivalent chromium or other chemicals, and retanning and wet finishing.
6	Through Blue--plants which process cured or raw cattle (or similar) hides into the "blue" stage only, by chemically dissolving the hair and tanning using trivalent chromium, with no retanning or wet finishing.
7	Shearling--plants which process cured or raw sheep (or similar) skins into finished leather by retaining the hair on the skin, tanning with trivalent chromium or other chemicals, and retanning and wet finishing.
8	Pigskin--plants which process cured or raw pig skins into finished leather by chrome tanning.

9	Retan/Splits--plants which process previously unhaired or pickled sheepskins and tanned hide into finished leather by retanning and wet finishing, including coloring, fatliquoring, and mechanical conditioning.

Note for the existing direct dischargers, a model representing four subcategories was developed. This model is described below:

4, 6, 7 & 8	Other--plants with processes similar to those described in either Subcategory 4, 6, 7 or 8 above.

For each of the above subcategories, at least one representative model was developed. Where there were several corresponding tanneries of varying sizes associated with the specific subcategory, various representative sizes of models for that subcategory were developed. The models were also differentiated according to the corresponding tanneries' methods of effluent discharge. The most common method of discharge for the industry is an indirect discharge of effluents to publicly owned treatment works (POTW's). Thus, indirect discharging models were developed for all subcategories. Direct discharging leather tanneries--those that discharge directly to a river, stream, lake, etc.--are not as numerous and, accordingly, can be represented by models from three of the subcategories. These direct discharging subcategories include Chrome Tan (1 & 2), Nonchrome Tan (3), and another category called "Other" (4, 6, 7 & 8). This latter category represents a combination of subcategories. Finally, model plants were also developed for each subcategory which were believed to be representative of new, yet-to-be constructed tanneries. These models, referred to as "new source models," are similar in many characteristics to the indirect discharging models although they can be either direct or indirect dischargers.

The various models utilized in this report to represent the leather tanning industry and their respective sizes are depicted in Table VI-1. These models were based on various assumptions; these are discussed in the following sections. The number of existing tanneries applicable to each of the models is depicted in Table VII-1.

B. Operational Characteristics

The operational characteristics for the direct discharging models and the indirect discharging and new source models are summarized in Tables VI-2 and VI-3, respectively. These characteristics were determined from the industry survey as well as discussions with industry members. As shown in the tables, most Chrome Tan (1 & 2), Nonchrome Tan (3), and Retan (4 and 9) models operate approximately 250 days per year. The Through Blue (6) model operates almost everyday of the year, and the No Beamhouse (5) and Shearling (7) models operate about 240 days each year. The Pigskin (8) model operates 300 days a year.

Table VI-1. The leather tanning industry, representative model plants' capacities

Model	Subcategory	Units	Capacity				
			X-Small	Small	Medium	Large	X-Large
			----------------(units per day)------------------				
INDIRECT DISCHARGERS AND NEW SOURCE TANNERS							
Chrome Tan/Pulp	1	Hides	175	500	1,000	2,000	5,400
Chrome Tan/Save	2	Hides	--	500	--	2,000	--
Nonchrome Tan	3	Hides	--	150	750	2,200	--
Retan/Sides	4	Sides	--	1,350	--	6,600	--
No Beamhouse	5	Skins	--	900	2,700	8,600	--
Through Blue	6	Hides	--	600	--	4,200	--
Shearling	7	Shearlings	--	900	--	2,500	--
Pigskin	8	Skins	--	--	3,625	--	--
Retan/Splits	9	Splits	--	2,700	--	7,400	--
DIRECT DISCHARGERS							
Chrome Tan	1 & 2	Hides	--	800	--	1,500	--
Nonchrome Tan	3	Hides	--	210	715	--	--
Other	4,6,7,8	Skins & Pelts	--	--	2,500	--	--

Source: DPRA estimates based on survey and published data.

Table VI-2. The leather tanning industry, representative direct discharging model plants' operational charcteristics

Model/size	Sub-category	Daily capacity			Days per year	Annual Capacity			Utilization rate (%)	Annual production		Number of employees
		Hides/ skins	Raw materials			Hides/ skins	Raw materials			Hides/ skins	Square feet	
			1000 pounds	KKG			1000 pounds	KKG			(1,000)	
Chrome Tan	1 & 2											
Small		800	44.1	20.0	250	203,670	11,217	5,087	85	173,120	7,666.3	90
Large		1,500	82.5	37.4	250	384,707	17,549	7,959	90	346,237	15,322.5	180
Nonchrome Tan	3											
Small		210	11.6	5.2	250	52,212	2,872	1,302	85	44,380	3,775.0	40
Medium		715	39.2	16.3	250	176,566	9,710	4,402	90	158,910	6,989.6	140
Other	4,6,7,8											
Medium		2,500	22.9	10.4	250	588,235	5,392	2,445	85	500,000	4,166.7	65

Source: DPRA estimates based on survey and published information.

Table VI-3. The leather tanning industry, representative existing indirect discharging and new source model plants' operational characteristics

Model/size	Sub-category	Daily capacity			Days per year	Annual capacity			Utilization rate(%)	Annual production		Number of employees 1/
		Hides/ skins	Raw materials			Hides/ skins	Raw materials			Hides/ skins	Square feet	
			1000 pounds	KKG			1000 pounds	KKG				
											(1000)	
Chrome Tan/Pulp	1	Hides										
X-Small		175	9.5	4.3	250	43,750	2,363	1,072	90	40,000	1,680	40
Small		500	27.0	12.2	250	125,000	6,750	3,061	80	100,000	4,200	100
Medium *		1,000	54.0	24.5	250	250,000	13,500	6,122	90	225,000	9,450	165
Large *		2,000	108.0	49.0	250	500,000	27,000	12,245	85	425,000	17,850	355
X-Large *		5,400	291.6	132.2	250	1,350,000	72,900	33,061	90	1,215,000	51,030	570
Chrome Tan/Save	2	Hides										
Small		500	25.0	11.3	250	125,000	6,250	2,834	80	100,000	4,200	80
Large *		2,000	100.0	45.4	250	500,000	25,000	11,388	85	425,000	17,850	390
Nonchrome Tan	3	Hides										
Small		150	9.0	4.1	250	37,500	2,250	1,020	90	33,750	1,350	45
Medium *		750	45.0	20.4	250	187,500	11,250	5,102	90	168,750	6,750	140
Large *		2,200	132.0	59.9	250	550,000	33,000	14,966	90	495,000	19,800	270
Retan/Sides	4	Sides										
Small		1,350	27.7	12.6	250	337,500	6,919	3,138	80	270,000	5,670	105
Large *		6,600	135.3	61.4	250	1,650,000	33,825	15,340	90	1,485,000	31,185	410
No Beamhouse	5	Skins										
Small		900	1.8	0.8	250	225,000	450	204	85	191,250	1,338.8	25
Medium *		2,700	5.4	2.4	250	675,000	1,350	612	85	573,750	4,016.2	70
Large *		8,600	17.2	7.8	250	2,150,000	4,300	1,950	90	1,935,000	13,545.0	215
Through Blue	6	Hides										
Small *		600	34.5	15.6	350	210,000	12,075	5,476	95	199,500	8,379.0	65
Large *		4,200	241.5	109.5	350	1,470,000	84,525	38,333	90	1,323,000	55,566.0	275
Shearling	7	Shearlings										
Small		900	10.8	4.9	240	216,000	2,592	1,176	90	194,400	1,555.2	65
Large *		2,500	30.0	13.6	240	600,000	7,200	3,265	90	540,000	4,320.0	220
Pigskin	8	Skins										
Medium *		3,625	68.9	31.2	300	1,087,500	20,663	9,371	95	1,033,500	11,368.5	210
Retan/Splits	9	Splits										
Small		2,700	27.0	12.2	250	675,000	6,750	3,061	80	540,000	4,320	70
Large *		7,400	74.0	33.6	250	1,850,000	18,500	8,390	90	1,665,000	13,320	190

1/ Number of employees depicted represents existing facilities only. New source facilities are anticipated to operate with 15 percent fewer employees.

* Denotes new sources models, also.

Source: DPRA estimates based on survey and published information.

Indirect and new source Chrome Tan (1 & 2), Nonchrome Tan (3), Retan (4 and 9), and Through Blue (6) models all utilize approximately 85 percent of their daily capacity. Indirect and new source No Beamhouse (5) models operate on a 85-90 percent utilization rate, Shearling (7) and Pigskin (8) models maintain a 90 and 95 percent rate, respectively. Direct discharging models' utilization rates vary from those shown for the indirect and new source models: the direct discharging Chrome Tan (1 & 2) models reflect an 85 percent utilization rate for the small model and a 90 percent rate for the large model, the Nonchrome Tan (3) direct discharging models reflect 85 percent for the small operation and 90 percent for the medium, the utilization rate for the Other (4, 6, 7 & 8) direct discharging model was determined to be 85 percent of the daily capacity.

Also shown in Tables VI-2 and VI-3 are the models' annual production estimated in terms of units (hides, skins, pelts) tanned and square feet of leather produced each year. To convert units-per-year to square feet of leather, the following standards were used:

> Cattlehides yield 40 square feet per hide, cattle splits yield 8 square feet per split and sheepskins yield 6.67 square feet per skin or pelt.

Finally, the estimated numbers of employees employed at each model tannery are also shown in the tables. It should be noted that the new source models' number of employees was estimated to be approximately 15 percent fewer than those determined for the indirect models. This slightly reduced employment requirement reflects the utilization of labor saving equipment and the requirement for a reduced maintenance force in the new source tanneries. This would not be available to the existing tanneries as they typically are committed to the majority of their fixed equipment and the costs for them to replace the equipment would be prohibitive.

C. Investment Characteristics

The investment characteristics for the direct discharging, indirect discharging, and new source models are depicted in Tables VI-4, VI-5, and VI-6, respectively. Included in these tables are estimates for the models' assets (both fixed and current), current liabilities, net working capital, total invested capital, and salvage value for nonconforming uses. These are discussed below.

1. Fixed Assets

The fixed assets depicted in the tables are representative of the book value of the acquisition costs of the tanneries' various assets. As would be expected in an industry with a substantial number of older plants and equipment, the book values of the models' assets do not reflect significant amounts. However, the book values do reflect the amount of capital the tannery owners have invested in assets and, accordingly, represent a portion of what is used as a basis for determining the return on the owners' equity.

Table VI-4. The leather tanning industry, representative existing direct discharging model plants' investment characteristics 1/

Model/size	Subcategory	Capacity	Total assets	Fixed assets	Current assets	Current liabilities	Net working capital	Total invested capital	Salvage value
		(Hides/Skins/Day)	($1,000)						
Chrome Tan	1 & 2								
Small		800	2,197	538	1,659	685	974	1,512	1,240
Large		1,500	6,603	2,279	4,324	3,576	748	3,027	3,236
Nonchrome Tan	3								
Small		210	1,498	683	815	281	534	1,217	677
Medium		715	6,351	2,057	4,294	1,271	3,023	5,081	3,892
Other	4,6,7,8								
Medium		2,500	2,937	1,257	1,680	580	1,100	2,357	1,390

1/ Total Assets = Fixed Assets + Current Assets; Net Working Capital = Current Assets - Current Liabilities; Total Invested Capital = Fixed Assets + Net Working Capital; Salvage Value = Net Working Capital + Fixed Assets times a salvage factor (10 to 20%).

Source: DPRA estimates based on survey and published data.

Table VI-5. The leather tanning industry, representative existing indirect discharging model plants' investment characteristics

Model/size	Subcategory	Daily capacity	Total assets	Fixed assets	Current assets	Current liabilities	Net working capital	Total invested capital	Salvage value
			($1,000)						
Chrome Tan/Pulp	1	Hides							
X-Small		175	674.9	236.2	438.7	216.3	222.4	458.6	269.6
Small		500	1,743.4	650.0	1,093.4	540.8	552.6	1,202.6	682.6
Medium		1,000	3,367.8	1,200.0	2,167.8	973.4	1,194.4	2,394.4	1,434.4
Large		2,000	7,905.8	2,100.0	5,805.8	1,195.1	4,610.7	6,710.7	5,030.7
X-Large		5,400	29,381.5	7,020.0	22,361.5	2,890.8	19,470.7	26,490.7	20,874.7
Chrome Tan/Save	2	Hides							
Small		500	1,743.4	650.0	1,093.4	540.8	552.6	1,202.6	682.6
Large		2,000	7,905.8	2,100.0	5,805.8	1,195.1	4,610.7	6,710.7	5,030.7
Nonchrome Tan	3	Hides							
Small		150	615.5	337.5	278.0	165.2	112.8	450.3	180.3
Medium		750	3,573.3	1,462.5	2,110.8	774.6	1,336.2	2,798.7	1,628.7
Large		2,200	17,207.0	3,960.0	13,247.0	1,969.1	11,277.9	15,237.9	12,069.9
Retan/Sides	4	Sides							
Small		1,350	2,972.6	675.0	2,297.6	584.0	1,713.6	2,388.6	1,848.6
Large		6,600	14,422.1	3,300.0	11,122.1	3,051.5	8,070.6	11,370.6	8,730.6
No Beamhouse	5	Skins							
Small		900	532.4	150.3	382.1	207.8	174.3	324.6	204.4
Medium		2,700	1,714.1	475.1	1,239.0	525.9	713.1	1,188.2	808.1
Large		8,600	6,175.1	1,568.2	4,606.9	1,313.9	3,293.0	4,861.2	3,606.6
Through Blue	6	Hides							
Small		600	1,796.6	810.0	986.6	654.4	332.2	1,142.2	494.2
Large		4,200	11,164.9	4,704.0	6,460.9	3,156.2	3,304.7	8,008.7	4,245.5
Shearling	7	Shearlings							
Small		900	2,023.1	450.0	1,573.1	681.2	891.9	1,341.9	981.9
Large		2,500	5,827.8	1,187.5	4,640.3	1,655.6	2,984.7	4,172.2	3,222.2
Pigskin		Skins							
Medium	8	3,625	1,724.4	509.8	1,214.6	491.1	723.5	1,233.3	825.5
Retan/Splits	9	Splits							
Small		2,700	968.5	297.0	671.5	267.6	403.9	700.9	463.3
Large		7,400	2,750.6	740.0	2,010.6	785.9	1,224.7	1,964.7	1,372.7

Source: DPRA estimates based on survey and published information.

Table VI-6. The leather tanning industry, representative new source model plants' investment characteristics

Model/size	Subcategory	Daily capacity	Total assets	Fixed assets	Current assets	Current liabilities	Net working capital	Total invested capital	Salvage value
			($1,000)						
Chrome Tan/Pulp	1	Hides							
Medium		1,000	7,715.9	5,548.1	2,167.8	973.4	1,194.4	6,742.5	2,026.6
Large		2,000	16,285.5	10,479.7	5,808.8	3,549.5	2,206.3	12,686.0	3,778.3
X-Large		5,400	52,321.2	29,959.7	22,361.5	16,054.2	6,307.3	36,267.0	10,796.8
Chrome Tan/Save	2	Hides							
Large		2,000	16,285.5	10,479.7	5,805.8	3,599.5	2,206.3	12,686.0	3,778.3
Nonchrome Tan	3	Hides							
Medium		750	7,997.5	5,886.7	2,110.8	774.2	1,336.2	7,222.9	2,219.2
Large		2,200	30,514.6	17,267.5	13,247.0	1,969.1	11,277.9	28,545.5	13,868.0
Retan/Sides	4	Sides							
Large		6,600	30,394.4	19,272.3	11,122.1	3,051.5	8,070.6	27,342.9	10,961.4
No Beamhouse	5	Skins							
Medium		2,700	3,576.0	2,337.0	1,239.0	525.9	713.1	3,050.1	1,063.7
Large		8,600	12,490.1	7,883.2	4,606.9	1,313.9	3,293.0	11,176.2	4,475.5
Through Blue	6	Hides							
Small		600	4,377.6	3,391.0	986.6	654.4	332.2	3,723.2	840.9
Large		4,200	28,948.5	22,487.6	6,460.9	3,156.2	3,304.7	25,792.3	6,677.8
Shearling	7	Shearlings							
Large		2,500	10,316.8	5,676.5	4,640.3	1,655.6	2,984.7	8,661.2	3,836.2
Pigskin	8	Skins							
Medium		3,625	4,488.7	3,274.1	1,214.6	491.1	723.5	3,997.6	1,214.6
Retan/Splits	9	Splits							
Large		7,400	6,725.9	4,715.3	2,010.6	785.9	1,224.7	5,940.0	1,932.0

Source: DPRA estimates based on survey and published data.

2. Operating Capital

The models' operating capital is defined as that capital necessary to maintain the day-to-day operations of the tanneries. Included in the computation of operating capital are a firm's current assets and current liabilities. Current assets represent those assets a firm maintains that could be converted to cash with relative ease. Current assets include such items as raw materials inventory, finished product inventory and accounts receivable.

As can be seen in the tables, current assets for the models are sizeable because substantial quantities of hides and leather must be maintained at any given time in order to assure continuous operation. This reflects a sizeable additional investment requirement to the tanneries' owners.

Current liabilities represent those a firm maintains on short-period demand, and include short-term notes and accounts and wages payable.

The difference between current assets and current liabilities represents the firm's operating capital or, as it is sometimes called, net working capital. Net working capital represents the quantity of capital that the firm is required to maintain for daily cash balances.

3. Total Investment

Two measures of investment for each model plant are provided. First, total assets--the sum of fixed assets and current assets. Second, the total invested capital--which represents fixed assets plus net working capital for each model is shown. These measures are summarized on Table VI-4, 5 and 6. While each represents an interpretation of the models' investments, total assets will be predominately utilized as the basis for measuring the models' returns on investment.

4. Salvage Value

The salvage value for nonconforming uses of the model tanneries represents the amount of money that the owners could recover should a tannery cease operation. This will vary widely from plant to plant, depending on the location and the age of the facility, its condition, and the usability of its equipment. In some instances, the salvage value of an old, obsolete plants will be equal to its site value and its equipment scrap value.

As described earlier in the report, only a limited market exists for certain types of used machinery and equipment; thus, most of a closing plant's equipment would be scrapped.

Data are not available depicting the salvage value of tanneries. Discussions with industry members determined that salvage values for most tanneries would range between 10 and 20 percent of a tannery's fixed assets plus its net working capital.

D. Sales and Costs Characteristics

Model plant sales and costs characteristics were developed from the industry survey responses, conversations with industry personnel, and from information available in published sources. Table VI-7 depicts the sales and cost characteristics for the existing direct discharging models, Table VI-8 the characteristics for the existing indirect discharging models, and Table VI-9 the characteristics for the new source models. These characteristics are reflective of 1979-1980 conditions.

Specific plant by plant data is available for direct dischargers and are used to project plant closures and production effects. The direct discharger models discussed below were developed to protect the confidentiality of the individual plant data and used to analyze other economic effects. It should be noted that some cost estimates for the direct discharger may not exactly correspond to those used in the direct discharge models because of the aggregation process used in developing the models.

1. Annual Sales

Annual sales of the model plants were determined from the production characteristics described in Tables VI-2 and VI-3 as well as from estimates of final product prices. Prices were established to be reflective of the average grade and quality of leather within each tannery type.

The prices utilized in this analysis are depicted below:

Type	Price 1/	Source
Cattlehide, Chrome	$1.03 sq. ft.	From industry surveys
Cattlehide, Vegetable	$1.53 sq. ft.	From industry surveys
Cattlehide, Through-the-Blue	$.71 sq. ft.	From industry surveys and contacts
Cattle, Sides	$1.03 sq. ft.	From industry surveys
Cattle, Splits	$.59 sq. ft.	From industry surveys American Shoemaking
Cattlehide, No Beamhouse	$0.97 sq. ft.	American shoemaking
Shearlings	$2.19 sq. ft.	From industry surveys
Pigskin	$0.48 sq. ft.	From industry surveys

1/ Prices presented are in 1979 dollars and the financial profiles of the model plants have been adjusted to reflect 1979 dollars. Also, it should be noted that cattlehide, vegetable leather and splits are usually priced on a per pound basis. For this analysis, these prices have been converted to a square footage basis.

Table VI-7. The leather tanning industry, representative existing direct discharging model plants' cost characteristics

	Chrome Tan (1 & 2)				Nonchrome Tan (3)				Other (4,6,7,8)	
	Small		Large		Small		Medium		Medium	
	1,000 dollars	Percent	1,000 dollars	Percent	1,000 dollars	Percent	1,000 dollars	Percent	1,000 dollars	Percent
Sales	8,049.6	100.0	16,099.1	100.0	4,341.3	100.0	14,468.5	100.0	5,791.7	100.0
Total Costs	7,558.6	94.0	14,891.7	92.5	4,093.8	94.3	13,658.3	94.4	5,403.6	93.3
Cash Earnings	491.0	6.1	1,207.4	7.5	247.5	5.7	810.2	5.6	388.1	6.7
Less Depreciation	48.3	0.6	289.8	1.8	65.1	1.5	202.7	1.4	81.1	1.4
Interest	64.4	0.8	209.3	1.3	13.0	0.3	361.8	2.5	92.7	1.6
Pretax Income	378.3	4.7	708.3	4.4	169.4	3.9	245.7	1.7	214.3	3.7
Income Tax	154.8	1.9	306.6	1.9	58.8	1.4	93.8	0.6	79.3	1.4
Aftertax Income	223.5	2.8	401.7	2.5	110.6	2.5	151.9	1.0	135.0	2.3
Cash Flow	271.8	3.4	691.5	4.3	175.7	4.0	354.6	2.5	216.1	3.7

1/ Percentages may not add due to rounding.

Source: DPRA estimates based on survey and published data.

Table VI-8. The leather tanning industry, representative existing indirect discharging model plants' cost characteristics 1/

	Chrome Tan/Pulp (1)									
	X-Small		Small		Medium		Large		X-Large	
	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent
SALES	1,730.4	100.0	4,326.0	100.0	9,733.5	100.0	18,385.5	100.0	52,560.9	100.0
COSTS										
Hides/Skins	1,036.8	59.9	2,592.0	59.9	5,832.0	59.9	11,016.0	59.9	31,492.8	59.9
Labor	356.5	20.6	999.3	23.1	1,800.7	18.5	4,026.4	21.9	7,568.8	14.4
Other	204.4	11.8	377.1	8.7	1,380.1	14.2	2,173.6	11.3	9,927.7	18.9
Total	1,597.7	92.3	3,968.4	91.7	9,012.8	92.6	17,216.0	93.1	48,989.3	93.2
CASH EARNINGS	132.7	7.7	357.6	8.3	720.7	7.4	1,169.5	6.4	3,571.6	6.8
LESS										
Depreciation	32.3	1.9	89.4	2.1	154.2	1.6	298.0	1.6	764.9	1.5
Interest	43.3	2.5	99.5	2.3	204.4	2.1	275.8	1.5	630.7	1.2
PRETAX INCOME	57.1	3.3	168.7	3.9	362.1	3.7	595.7	3.2	2,176.0	4.1
INCOME TAX	11.4	0.7	58.4	1.3	147.3	1.5	254.8	1.4	981.7	1.9
AFTERTAX INCOME	45.7	2.6	110.3	2.6	214.8	2.2	340.9	1.9	1,194.3	2.3
CASH FLOW	78.0	4.5	199.7	4.6	369.0	3.8	638.9	3.5	1,959.2	3.7

1/ Percentages may not add due to rounding.

Source: DPRA estimates based on survey and published data.

Table VI-8 (continued). The leather tanning industry, representative existing indirect discharging model plants' cost characteristics

	Chrome Tan/Save (2)				Nonchrome Tan (3)					
	Small		Large		Small		Medium		Large	
	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent
SALES	4,326.0	100.0	18,385.5	100.0	2,065.5	100.0	10,327.5	100.0	30,294.0	100.0
COSTS										
Hides/Skins	2,592.0	59.9	11,016.0	59.9	1,215.0	58.8	6,075.0	58.8	17,820.0	58.8
Labor	817.6	18.9	3,842.6	20.9	477.1	23.1	1,414.9	13.7	3,574.7	11.8
Other	578.7	13.4	2,378.1	13.0	260.6	12.6	2,319.9	22.5	7,006.0	23.2
TOTAL	3,988.3	92.2	17,236.7	93.8	1,952.7	94.5	9,809.8	95.0	28,400.7	93.8
CASH EARNINGS	337.7	7.8	1,148.8	6.2	112.8	5.5	517.7	5.0	1,893.3	6.2
LESS										
Depreciation	69.5	1.6	277.3	1.5	30.2	1.5	162.5	1.6	626.9	2.1
Interest	99.5	2.3	275.8	1.5	8.3	0.4	51.6	0.5	212.1	0.7
Pretax Income	168.7	3.9	595.7	3.2	74.3	3.6	303.6	2.9	1,054.3	3.5
Income Tax	58.4	1.3	254.8	1.4	16.5	0.8	120.4	1.2	465.7	1.5
Aftertax Income	110.3	2.5	340.9	1.9	57.8	2.8	183.2	1.8	588.6	1.9
CASH FLOW	179.8	4.2	618.2	3.4	88.0	4.3	345.7	3.3	1,215.5	4.0

1/ Percentages may not add due to rounding.

Source: DPRA estimates based on survey and published data.

Table VI-8 (continued). The leather tanning industry, representative existing indirect discharging model plants' cost characteristics 1/

	Retan/Sides (4)			
	Small		Large	
	1000 dollars	Percent	1000 dollars	Percent
SALES	5,840.1	100.0	32,120.6	100.0
COSTS				
Hides/Skins	3,798.9	65.0	20,894.0	65.0
Labor	1,076.6	18.4	4,184.5	13.0
Other	651.9	11.2	5,260.5	16.4
TOTAL	5,527.4	94.6	30,339.0	94.5
CASH EARNINGS	312.7	5.4	1,781.6	7.5
LESS				
Depreciation	96.6	1.7	496.8	1.6
Interest	58.4	1.0	321.2	1.0
PRETAX INCOME	157.7	2.7	963.6	3.0
INCOME TAX	53.3	0.9	424.0	1.3
AFTERTAX INCOME	104.4	1.8	539.6	1.7
CASH FLOW	201.0	3.4	1,036.4	3.2

1/ Percentanges may not add due to rounding.

Source: DPRA estimates based on survey and published data.

Table VI-8 (continued). The leather tanning industry, representative existing indirect discharging model plants' cost characteristics 1/

	No Beamhouse (5)						Through Blue (6)			
	Small		Medium		Large		Small		Large	
	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent
SALES	1,298.6	100.0	3,895.7	100.0	13,138.6	100.0	5,949.1	100.0	39,451.9	100.0
COSTS										
Hides/Skins	594.8	45.8	1,784.4	45.8	6,017.8	45.8	4,015.9	67.5	26,632.0	67.5
Labor	280.7	21.6	769.6	19.8	2,435.2	18.5	719.9	12.1	3,472.5	8.8
Other	327.3	25.2	1,069.6	27.5	3,890.7	29.6	761.5	12.8	7,508.1	19.0
TOTAL	1,202.8	92.6	3,623.6	93.0	12,343.5	93.9	5,497.3	92.4	37,612.6	95.3
CASH EARNINGS	95.9	7.4	272.1	7.0	795.1	6.1	451.8	7.6	1,839.3	4.7
LESS										
Depreciation	22.0	1.7	65.7	1.7	190.7	1.4	150.8	2.5	1,111.3	2.8
Interest	20.8	1.6	54.5	1.4	131.4	1.0	136.8	2.3	591.8	1.5
PRETAX INCOME	53.0	4.1	151.9	3.9	473.0	3.6	164.2	2.8	1,136.2	2.9
INCOME TAX	10.2	0.8	50.6	1.3	198.3	1.5	56.3	0.9	503.4	1.3
AFTERTAX INCOME	42.8	3.3	101.3	2.6	274.7	2.1	107.9	1.8	632.8	1.6
CASH FLOW	64.8	5.0	167.0	4.6	465.4	3.5	258.7	4.3	1,855.4	4.7

1/ Percentages may not add due to rounding.

Source: DPRA estimates based on survey and published data.

Table VI-8 (continued). The leather tanning industry, representative existing indirect discharging model plants' characteristics 1/

	Shearling (7)				Pigskin (8)		Retan/Splits (9)			
	Small		Large		Medium		Small		Large	
	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent
SALES	3,405.9	100.0	9,460.8	100.0	5,456.9	100.0	2,548.8	100.0	7,858.8	100.0
COSTS										
Hides/Skins	2,041.2	59.9	5,670.0	59.9	1,788.0	32.8	1,090.8	42.8	3,363.3	42.8
Labor	863.5	25.4	2,600.8	27.5	2,385.8	43.7	680.3	26.7	1,899.7	24.2
Other	217.1	6.4	407.5	4.3	827.2	15.2	631.5	24.8	2,143.1	27.3
TOTAL	3,121.8	91.7	8,678.3	91.7	5,001.0	91.6	2,402.6	94.3	7,406.1	94.2
CASH EARNINGS	284.1	8.3	782.5	8.3	455.9	8.4	146.2	5.7	452.7	5.8
LESS										
Depreciation	57.3	1.7	97.5	1.0	124.1	2.3	54.5	2.1	158.0	2.0
Interest	81.7	2.4	264.9	2.8	76.4	1.4	33.1	1.3	94.3	1.2
PRETAX INCOME	145.1	4.3	420.1	4.4	255.4	4.7	58.6	2.3	200.4	2.6
INCOME TAX	47.5	1.4	174.0	1.8	98.2	1.8	11.8	0.5	72.9	0.9
AFTERTAX INCOME	97.6	2.9	246.1	2.6	157.2	2.9	46.8	1.8	127.5	1.6
CASH FLOW	154.9	4.5	343.2	3.6	281.3	5.2	101.3	4.0	285.5	3.6

1/ Percentages may not add due to rounding.

Source: DPRA estimates based on survey and published data.

Table VI-9. The leather tanning industry, representative new source model plants' cost characteristics 1/

	Chrome Tan/Pulp (1)					
	Medium		Large		X-Large	
	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent
SALES	9,733.5	100.0	18,385.5	100.0	52,560.9	100.0
COSTS						
Hides/Skins	5,832.0	59.9	11,016.0	59.9	31,492.8	59.9
Labor	1,416.6	14.6	2,589.6	14.1	5,673.8	10.8
Other	1,081.9	11.1	2,342.9	12.7	7,965.2	15.2
TOTAL	8,330.5	85.6	15,948.5	86.7	45,131.8	85.9
CASH EARNINGS	1,403.0	14.4	2,437.0	13.3	7,429.1	14.1
LESS						
Depreciation	277.4	2.8	524.0	2.9	1,498.0	2.9
Interest	155.1	1.6	291.8	1.6	834.1	1.6
PRETAX INCOME	970.5	10.0	1,621.2	8.8	5,097.0	9.7
INCOME TAX	427.2	5.4	726.5	4.0	2,325.4	4.4
AFTERTAX INCOME	432.3	5.6	894.7	4.9	2,771.6	5.3
CASH FLOW	820.7	8.4	1,418.7	7.7	4,269.6	8.1

1/ Percentages may not add due to rounding.

Source: DPRA estimates based on survey and published data.

Table VI-9 (continued). The leather tanning industry, representative new source model plants' cost characteristics 1/

	Chrome Tan/Save (2)		Nonchrome Tan (3)			
	Large		Medium		Large	
	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent
SALES	18,385.5	100.0	10,327.5	100.0	30,294.0	100.0
COSTS						
Hides/Skins	11,016.0	59.9	6,075.0	58.8	17,820.0	58.8
Labor	3,044.3	16.6	1,131.9	11.0	2,829.5	9.3
Other	1,905.8	10.4	1,870.6	18.1	5,566.7	18.4
TOTAL	15,966.1	86.8	9,077.5	87.9	26,216.2	86.5
CASH EARNINGS	2,419.4	13.2	1,250.0	12.1	4,077.8	13.5
LESS						
Depreciation	524.0	2.9	294.3	2.8	863.4	2.9
Interest	291.8	1.6	166.1	1.6	656.5	2.2
PRETAX INCOME	1,603.6	8.7	789.6	7.6	2,557.9	8.4
INCOME TAX	718.4	3.9	344.0	3.3	1,157.4	3.8
AFTERTAX INCOME	885.2	4.8	445.6	4.3	1,400.5	4.6
CASH FLOW	1,409.2	7.7	789.9	7.6	2,263.9	7.5

1/ Percentages may not add due to rounding.

Source: DPRA estimates based on survey and published data.

Table VI-9 (continued). The leather tanning industry, representative new source model plants' cost characteristics 1/

	Retan/Side (4)		No Beamhouse (5)			
	Large		Medium		Large	
	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent
SALES	32,120.5	100.0	3,895.7	100.0	13,138.6	100.0
COSTS						
Hides/Skins	20,894.0	65.0	1,784.4	45.8	6,017.8	45.8
Labor	3,307.2	10.3	618.9	15.9	1,961.8	14.9
Other	4,175.1	13.0	858.3	22.0	3,147.0	24.0
TOTAL	28,376.3	88.3	3,261.6	83.7	11,126.6	84.7
CASH EARNINGS	3,744.2	11.7	634.1	16.3	2,012.0	15.3
LESS						
Depreciation	963.6	3.0	116.9	3.0	394.2	3.0
Interest	628.9	2.0	70.2	1.8	257.1	2.0
PRETAX INCOME	2,151.7	6.7	447.4	11.5	1,360.7	10.4
INCOME TAX	970.5	3.0	186.6	4.8	606.7	4.6
AFTERTAX INCOME	1,181.2	3.7	260.8	6.7	754.0	5.7
CASH FLOW	2,144.8	6.7	377.7	9.7	1,148.2	8.7

1/ Percentages may not add due to rounding.

Source: DPRA estimates based on survey and published data.

Table VI-9 (continued). The leather tanning industry, representative new source model plants' cost characteristics 1/

	Through Blue (6)				Shearling (7)	
	Small		Large		Large	
	1000 dollars	Percent	1000 dollars	Percent	1000 dollars	Percent
SALES	5,949.1	100.0	39,451.9	100.0	9,460.8	100.0
COSTS						
Hides/Skins	4,015.4	67.5	26,632.0	67.5	5,670.0	59.9
Labor	565.6	9.5	2,477.3	6.3	2,005.9	21.2
Other	600.5	10.1	5,362.3	13.6	313.1	3.3
TOTAL	5,182.0	87.1	34,471.6	87.4	7,989.0	84.4
CASH EARNINGS	767.1	12.9	4,980.3	12.6	1,471.8	15.6
LESS						
Depreciation	169.6	2.9	1,124.4	2.9	283.8	3.0
Interest	85.6	1.4	593.2	1.5	199.2	2.1
PRETAX INCOME	511.9	8.6	3,262.7	8.3	988.8	10.5
INCOME TAX	216.2	3.6	1,481.6	3.8	435.6	4.6
AFTERTAX INCOME	295.7	5.0	1,781.1	4.5	553.2	5.8
CASH FLOW	465.3	7.8	2,905.5	7.4	837.0	8.8

1/ Percentages may not add due to rounding.

Source: DPRA estimates based on survey and published data.

Table VI-9 (continued). The leather tanning industry, representative new source model plants' cost characteristics 1/

	Pigskin (8)		Retan/Splits (9) Large	
	1000 dollars	Percent	1000 dollars	Percent
SALES	5,456.9	100.0	7,858.8	100.0
COSTS				
Hides/Skins	1,788.0	32.8	3,363.3	42.8
Labor	1,888.9	34.6	1,535.0	19.5
Other	545.3	10.0	1,731.0	22.0
TOTAL	4,222.2	77.4	6,629.3	84.4
CASH EARNINGS	1,234.7	22.6	1,229.5	15.6
LESS				
Depreciation	163.7	3.0	235.8	3.0
Interest	91.9	1.7	136.6	1.7
PRETAX INCOME	979.1	17.9	857.1	10.9
INCOME TAX	431.2	7.9	375.0	4.8
AFTERTAX INCOME	548.0	10.0	482.1	6.1
CASH FLOW	711.7	13.0	717.9	9.1

1/ Percentages may not add due to rounding.

Source: DPRA estimates based on survey and published data.

2. Raw Material Costs

The raw material costs analyzed were for raw cattlehides or splits, or sheep skins or pelts. Raw cattlehides are sold by slaughterhouses on a poundage basis, and this analysis assumed an average hide weight of 55 pounds. Prices utilized reflected the annual average price for Chicago Native Heavy hides of 47 cents per pound.

The price utilized for raw cattle splits, $2.02 per split, was determined from industry surveys.

Raw sheepskin prices were assumed to be $5.88 per skin in the pickled state. The price for sheep pelts was estimated to be $10.50 per pelt. Both the sheep skin and sheep pelt prices were estimated from industry surveys. Pigskin prices were assumed to be $1.44 per skin.

3. Labor Costs

Labor costs were developed by multiplying the estimated number of employees for each model plant by an estimate of the annual costs per employee. These costs, developed from industry-provided data, reflect varying wages for different types and sizes of tanneries.

For the chrome tanneries (1 & 2), annual labor costs per employee averaged $16,667. For the nonchrome tanneries (3), annual labor costs were estimated to be $11,111 per employee. Labor costs for retan tanneries (4) were estimated to be $14,444 per year; no beamhouse tanneries (5) $13,222 per year; through-the-blue tanneries (6), $16,667; shearling tanneries (7), $14,295 per year; and pigskin tanneries (8), $10,962.

4. Tanning Materials and Other Costs

These costs include expenditures for materials used in the tanning process, miscellaneous other direct costs, and indirect costs (i.e., administrative expenses). These costs vary considerably for different tanneries. For the models, the costs ranged between 4.3 and 29.6 percent of sales.

5. Depreciation and Interest Costs

Estimates of the model tanneries' depreciation and interest costs were developed from responses to the industry survey as well as from data available from the Internal Revenue Service. The models' depreciation costs, expressed as a percent of sales and as a percent of fixed assets, are shown in Table VI-10. For both types of existing models (direct and indirect), depreciation as a percent of fixed assets for the existing models ranged from 8.2 percent to 24.3 percent. For the new source models, depreciation as a percent of fixed assets was 5.0 percent. The resulting new source depreciation expressed as a percent of sales ranged from 2.0 to 3.0 percent. Also shown in Table VI-10 are the models' interest charges expressed as a percent of sales. As shown, these charges ranged from 0.3 percent of a models' sales to 2.8 percent. As would be expected, the higher percentages were incurred by the new source models since the new source models would have a significantly higher amount of debt.

Table VI-10. The leather tanning industry, representative model plants' depreciation and interest

Model/Size	Subcategory	Existing - Direct Dischargers			Existing - Indirect Dischargers			New Source Dischargers		
		Depreciation		Interest	Depreciation		Interest	Depreciation		Interest
		Percent of sales	Percent of fixed assets	Percent of sales	Percent of sales	Percent of fixed assets	Percent of sales	Percent of sales	Percent of fixed assets	Percent of sales
		Percent								
Chrome Tan/Pulp	1									
X-Small		--			1.9	13.7	2.5	--	--	--
Small		0.6	9.0	0.8	2.1	15.1	2.3	--	--	--
Medium		--			1.6	12.9	2.1	2.8	5.0	1.6
Large		1.8	12.7	1.3	1.6	14.2	1.5	2.9	5.0	1.6
X-Large		--	--	--	1.5	10.9	1.2	2.9	5.0	1.6
Chrome Tan/Save	2									
Small		--	--	--	1.6	10.7	2.3	--	--	--
Large		--	--	--	1.5	13.2	1.5	2.9	5.0	1.6
Nonchrome Tan	3									
Small		1.5	9.5	0.3	1.5	8.9	0.4	--	--	--
Medium		1.4	9.8	2.5	1.6	11.1	0.5	2.8	5.0	1.6
Large		--	--	--	2.1	15.8	0.7	2.9	5.0	2.2
Retan/Sides	4									
Small		--	--	--	1.7	14.3	1.0	--	--	--
Large		--	--	--	1.6	15.1	1.0	3.0	5.0	2.0
No Beamhouse	5									
Small		--	--	--	1.7	14.6	1.6	--	--	--
Medium		--	--	--	1.7	13.8	1.4	3.0	5.0	1.8
Large		--	--	--	1.4	12.2	1.0	3.0	5.0	2.0
Through Blue	6									
Small		--	--	--	2.5	18.6	2.3	2.9	5.0	1.4
Large		--	--	--	2.8	23.6	1.5	2.9	5.0	1.5
Shearling	7									
Small		--	--	--	1.7	12.7	2.4	--	--	--
Large		--	--	--	1.0	8.2	2.8	3.0	5.0	2.1
Pigskin	8									
Medium		--	--	--	2.3	24.3	1.4	3.0	5.0	1.7
Retan/Splits	9									
Small		--	--	--	2.1	18.4	1.3	--	--	--
Large		--	--	--	2.0	21.4	1.2	3.0	5.0	1.7
Other Chrome	5 & 7									
Medium		1.4	6.5	1.6	--	--	--	--	--	--

Source: DPRA estimates based on survey and published information.

E. Model Plant Income and Annual Cash Flow Characteristics

For each model plant, the following were computed: its after-tax income, returns on sales, total assets, total invested capital, and annual cash flow expressed as an amount, as a percent of sales, and as a percent of total invested capital. These are presented in Table VI-11 for the existing direct discharging models, Table VI-12 for the existing indirect discharging models, and Table VI-13 for the new source models. It should be noted that these profits and annual cash flows represent tanneries as of early 1979 conditions and the models are "baseline models" which do not reflect the pollution control expenditures under consideration.

The before-tax returns on sales average 3.7 percent for the direct discharger models, ranging from a low of 1.7 percent for the medium Nonchrome model to 4.7 percent for the small Chrome Tan model. For the indirect dischargers, the before-tax returns averaged 3.5 percent varying from 2.3 percent for the small Retan/Splits model to 4.7 percent for the Pigskin model.

The base case models' after-tax incomes and annual cash flows are discussed below for each of the three major types of model plants.

1. Existing Direct Discharging Models

As shown in Table VI-11, after-tax income for the five direct discharging models range from $110,600 for the small Nonchrome Tan (3) model to $401,700 for the large Chrome Tan (1 & 2) model. The return on sales varied from 1.2 percent for the medium Nonchrome Tan (3) model to 2.8 percent for the small Chrome Tan (1 & 2) model. The return on assets were relatively low with four models showing rates less than 10 percent. The highest return was earned by the small Chrome Tan (1 & 2) model at 10.2 percent.

The models' annual cash flows ranged from a low of $175,700 for the small Nonchrome Tan (3) model to a high of close to $700,000 for the large Chrome Tan (1 & 2). As percent of sales, cash flows ranged from 2.6 percent to 4.3 percent.

2. Existing Indirect Discharging Models

Table VI-12 depicts the models' after-tax income, and as can be seen, they all are positive. The models' returns on sales are fairly consistent for all models with a range from 1.6 percent to 3.3 percent. After-tax returns on total assets are a bit more varied with a range from 3.4 percent to 9.4 percent.

The models' annual cash flows expressed as a percent of sales ranged from 3.2 percent to 5.2 percent and, as a percent of total invested capital, from 7.4 percent to 23.2 percent.

Table VI-11. The leather tanning industry, representative existing direct discharging model plants' profitabilities and annual cash flows

Model/size	Subcategory	Aftertax returns				Annual cash flow		
		Aftertax income	Sales	Total assets	Total invested capital	Amount	Percent of sales	Percent of total invested capital
		($1,000)	(%)	(%)	(%)	($1,000)	(%)	(%)
Chrome Tan	1 & 2							
Small		223.5	2.8	10.2	14.8	271.8	3.4	18.0
Large		401.7	2.5	6.1	13.3	691.5	4.3	22.8
Nonchrome Tan	3							
Small		110.6	2.5	7.4	9.1	175.7	4.0	14.4
Medium		151.9	1.2	2.7	3.4	354.6	2.6	7.4
Other Chrome	5 & 7							
Medium		135.0	2.3	4.6	5.7	216.1	3.7	9.2

Source: Computations based on information provided in previous Chapter VI Tables.

Table VI-12. The leather tanning industry, representative existing indirect discharging model plants' profitabilities and annual cash flows

Model/size	Subcategory	Aftertax income	Aftertax returns			Annual cash flows		
			Sales	Total assets	Total invested capital	Amount	Percent of sales	Percent of total invested capital
		($1,000)	(%)	(%)	(%)	($1,000)	(%)	(%)
Chrome Tan/Pulp	1							
X-Small		45.7	2.6	6.8	10.0	78.0	4.5	17.0
Small		110.3	2.6	6.3	9.2	199.7	4.6	16.6
Medium		214.8	2.2	6.4	9.0	369.0	3.8	15.4
Large		340.9	1.9	4.3	5.1	638.9	3.5	9.5
X-Large		1,194.3	2.3	4.1	4.5	1,959.2	3.7	7.4
Chrome Tan/Save	2							
Small		110.3	2.5	6.3	9.2	179.8	4.2	15.0
Large		340.9	1.9	4.3	5.1	618.2	3.4	9.2
Noncrhome Tan	3							
Small		57.8	2.8	9.4	12.8	88.0	4.3	19.5
Medium		183.2	1.8	5.1	6.5	345.7	3.3	12.4
Large		588.6	1.9	3.4	3.9	1,215.5	4.0	8.0
Retan/Sides	4							
Small		104.4	1.8	3.5	4.4	201.0	3.4	8.4
Large		539.6	1.7	3.7	4.7	1,036.4	3.2	9.1
No Beamhouse	5							
Small		42.8	3.3	8.0	13.2	64.8	5.0	20.0
Medium		101.3	2.6	5.9	8.5	167.0	4.6	14.1
Large		274.7	2.1	4.4	5.7	465.4	3.5	9.6
Through Blue	6							
Small		107.9	1.8	6.0	9.4	258.7	4.3	22.6
Large		632.8	1.6	5.7	7.9	1,855.4	4.7	23.2
Shearling	7							
Small		97.6	2.9	4.8	7.3	154.9	4.5	11.5
Large		246.1	2.6	4.2	5.9	343.2	3.6	8.2
Pigskin	8							
Medium		157.2	2.9	9.1	12.7	281.3	5.2	22.8
Retan/Splits	9							
Small		46.8	1.8	4.8	6.7	101.3	4.0	14.5
Large		127.5	1.6	4.6	6.5	285.5	3.6	14.5

Source: DPRA estimates based on survey and published information.

Table VI-13. The leather tanning industry, representative new source model plants' profitabilities and annual cash flows

Model/size	Subcategory	Aftertax income	Aftertax returns			Annual cash flows		
			Sales	Total assets	Total invested capital	Amount	Percent of sales	Percent of total invested capital
		($1,000)	(%)	(%)	(%)	($1,000)	(%)	(%)
Chrome Tan/Pulp	1							
Medium		543.3	5.6	7.0	8.1	820.7	8.4	12.2
Large		894.7	4.9	5.5	7.1	1,418.7	7.7	11.2
X-Large		2,771.6	5.3	5.3	7.6	4,269.6	8.1	11.8
Chrome Tan/Save	2							
Large		885.2	4.8	5.4	7.0	1,409.2	7.7	11.1
Nonchrome Tan	3							
Medium		445.6	4.3	5.6	6.2	789.9	7.6	10.9
Large		1,400.5	4.6	4.6	4.9	2,263.9	7.5	7.9
Retan/Sides	4							
Large		1,181.2	3.7	3.9	4.3	2,144.8	6.7	7.8
No Beamhouse	5							
Medium		260.8	6.7	7.3	8.6	377.7	9.7	12.4
Large		754.0	5.7	6.0	6.7	1,148.2	8.7	10.3
Through Blue	6							
Small		295.7	5.0	6.8	7.9	465.3	7.8	12.5
Large		1,781.1	4.5	6.2	6.9	2,905.5	7.4	11.3
Shearling	7							
Large		553.2	5.8	5.4	6.4	837.0	8.8	9.7
Pigskin	8							
Medium		548.0	10.0	12.2	13.7	711.7	13.0	17.8
Retan/Splits	9							
Large		482.1	6.1	7.2	8.1	717.9	9.1	12.1

Source: Computations based on information provided in previous Chapter VI tables.

3. New Source Models

The after-tax incomes of the new source models were appreciably higher than those of the existing indirect discharging models. Returns on sales ranged from 3.7 percent for the large Retan/Sides model to 10.0 percent for the Pigskin (8) model. The return of most of the models varied between 4.0 and 6.0 percent. As would be expected, the new source models' returns on total assets were all lower than the returns for the models depicted in Table VI-13 since the new source models have higher levels of investment which, accordingly, would result in lower returns.

Because of the higher annual depreciation associated with the new source models, their annual cash flows were all higher than those for the existing indirect dischargers. New source annual cash flows expressed as percent of sales ranged from 6.7 percent to 13.0 percent.

VII. WASTEWATER CONTROL COSTS

The various wastewater control alternatives and costs discussed in this chapter were developed by the Environmental Protection Agency. The supportive data and analyses for the treatment alternatives are presented in a separate document. 1/

Included in this chapter are a brief description of the discharge status of the leather tanning industry and a presentation of the various pollution control technologies and costs for each of the tannery models. It should be noted that while cost data presented in this chapter are reflective of the models, for the existing direct discharging tanneries, each facility was individually costed. For purposes of presentation in this report, the individual facilities' data have been aggregated. In this chapter, both direct and indirect existing sources are first discussed followed by both direct and indirect new sources.

A. Discharge Status of the Industry

Current practices in the tanning industry range from no treatment of wastewater to secondary treatment. In general, effluent quality requirements for tanneries discharging to municipal sewer systems (requirements set by POTW's) have been less stringent than for plants that discharge directly to surface waters (requirements set by EPA or states). This was reflected in the survey made of 89 wet-process tanners by EPA which indicated that 12 percent of the tanners discharging to municipal systems had no pretreatment, whereas all direct dischargers surveyed had at least preliminary treatment. Further, 100 percent of the direct dischargers operated some type of biological treatment.

EPA's information collection surveys, site visits, and verification sampling visits of wet tanneries yielded the following breakdown of control practices in the industry:

1/ Final Development Document for Proposed Effluent Limitations Guidelines, New Source Performance Standards and Pretreatment Standards for the Leather Tanning and Finishing Industry Point Source Category, U.S. Environmental Protection Agency, EPA 440/11-82-016, Nov. 1982, see p. II-1.

Discharge to POTW's--90 percent of industry--78 percent of tanners surveyed.

	Number of tanners	Percent of tanners surveyed
No pretreatment	4	7
Screening only	13	22
Primary treatment	32	54
Secondary treatment	4	7
Unknown (no response)	6	10
Total surveyed	59	100

Discharge to surface waters--10 percent of the industry--22 percent of tanners surveyed.

	Number of tanners	Percent of tanners surveyed
Aerated lagoon	6	35
Activated sludge	5	29
Unaerated lagoon	2	12
Rotating biological contactors	2	12
Trickling filter-lagoon system	1	6
No secondary treatment	1	6
Total surveyed	17	100

The discharge status--direct and indirect--of the estimated 158 wet tanners in the industry is shown in Table VII-1. Presently, 17 known tanneries discharge directly into navigable streams or water. Of this group, 8 are classified as small, 4 medium, and 5 large, with 7 of the of the 17 engaged in nonchrome tanning, Subcategory 3. The remaining 141 plants are classified as indirect dischargers. Of this number, 56 plants (40 percent of the total indirect dischargers) are identified in Subcategory 1, Chrome Tan/Pulp. The remainder are distributed among the remaining subcategories and include all sizes from small to large.

B. Wastewater Treatment Technologies

The treatment technologies utilized in this impact analysis were developed by EPA. For each model plant, alternative treatment technologies were costed to enable the impacts to be assessed. The technologies costed were designed specifically for the model plants described in Chapter VI and reflect their respective discharge status, flow, and age (i.e., new source versus existing).

Table VII-1. The leather tanning industry - discharge status
(before baseline closures)

Model/size	Subcategory	Number of plants Direct dischargers	Indirect dischargers	Total
Crome Tan/Pulp	1			
X-Small		--	6	6
Small		1	22	23
Medium		2	12	14
Large		2	11	13
X-Large		--	5	5
Chrome Tan/Save	2			
Small		1	3	4
Large		1	2	3
Nonchrome Tan	3			
Small		3	3	6
Medium		--	4	4
Large		2	1	3
Retan/Sides	4			
Small		1	8	9
Large		--	7	7
No Beamhouse	5			
Small		--	7	7
Medium		--	7	7
Large		--	10	10
Through Blue	6			
Small		1	7	8
Large		--	5	5
Shearling	7			
Small		1	3	4
Medium		1	3	4
Pigskin	8			
Medium		1	1	2
Retan/Splits	9	--		
Small		--	9	9
Large		—	5	5
Total Plants		17	141	158

A detailed description of the technologies under consideration is contained in the Development Document. 1/

The wastewater treatment technologies considered in this analysis include the following treatment options and represent certain changes from the previous options addressed in the July 2, 1979 proposed regulation. 2/

(1) Best Practicable Control Technology Currently Available (BPT)

Extended aeration activated sludge biological treatment, including coagulation-sedimentation with equalization

Best Available Technology Economically Achievable (BAT)

BAT Option I = Equal to BPT

BAT Option II = In-plant control and segregated stream pretreatment, plus activated sludge upgraded primarily by powdered activated carbon (PAC)

BAT Option III = BAT II with the addition of multimedia filtration

(2) Pretreatment Standards for Existing Sources (PSES)

PSES Option I = In-plant controls (depending on subcategory), including stream segregation and water conservation, segregated stream pretreatment, including fine screening and catalytic oxidation of beamhouse wastewater; and pH control and monitoring (pH and flow) at the combined sewer discharge

PSES I includes control capability for the regulation of sulfide

PSES Option II = PSES I plus in-plant control, including chromium recovery and reuse; segregated stream pretreatment, including fine screening/equalization and coagulation-sedimentation of tanyard wastewater; and dewatering of sludges

PSES II includes control capability for sulfide and chromium

1/ EPA, op. cit.

2/ The options identified herein are taken from the "Notice of Availability and Request for Comments," Federal Register, June 2, 1982.

PSES Option III = Controls in addition to those in PSES II (depending on subcategory) as follows: segregated stream pretreatment, including flue gas coagulation-sedimentation of beamhouse wastewaters, equalization and coagulation-sedimentation of combined wastewaters in place of the same unit processes applied to segregated tanyard wastewaters

PSES III includes control capability for sulfide and chromium

(3) New Source Performance Standards (NSPS)

NSPS Option I = Require limitations equal to BAT I with reduced flow

NSPS Option II = Require limitations equal to BAT II with reduced flow

NSPS Option III = Require limitations equal to BAT III with reduced flow

(4) Pretreatment Standards for New Sources (PSNS)

PSNS Option I = Require limitations equal PSES I

PSNS Option II = Require limitations equal to PSES II

PSNS Option III = Require limitations equal to PSES III

C. Wastewater Treatment Costs

The wastewater treatment costs, as provided by EPA, were based on the model plants' production levels, estimated wastewater flows, and wastewater characteristics as discussed in the Development Document. [1/]

1. Investment Costs

The investment costs for the treatment alternatives were primarily based on the estimated wastewater flow or hydraulic load of the model tanneries. These costs were developed by the technical contractor and were based on the following assumptions.

- Costs were expressed in first quarter, 1980 dollars.

[1/] EPA, op. cit.

- Expected accuracy for these conceptual estimates was plus or minus 30 to 40 percent.

- All design specifications were prepared by outside consulting engineers in accordance with applicable codes.

- Construction work was performed by outside contractor using union labor and no work was performed by in-plant labor or maintenance personnel.

- No land acquisition costs were included because, for direct dischargers, land acquisition is not necessary to accommodate BPT. For indirect dischargers, it was assumed that no acquisition of adjacent land would be necessary, as was found generally to be the case in a survey.

- Approximately 23 percent of investment costs were allowed for contingency and engineering design costs.

The wastewater control investment requirements for the existing direct and indirect discharging models are depicted in Table VII-2. The costs presented in Table VII-2, and all subsequent tables, reflect the costs associated with the models going from the models' base cases to the various treatment options. The investment requirements for the new source models are shown in Table VII-3.

2. Annualized Costs

Annualized wastewater treatment costs consist of annual operating and maintenance expenditures, cost of capital and depreciation. The annual operating and maintenance expenditures were provided by EPA and are shown in Table VII-4 for the existing models and Table VII-5 for the new source models. The estimated industry cost of capital, discussed in Chapter IV, was determined to be 11.0 percent. Depreciation assumed a 15 year asset life with no salvage value. A straight-line depreciation method was used.

The estimated annualized costs for the wastewater control technologies are shown in Table VII-6 for the existing models and Table VII-7 for the new source models.

3. Aggregated Industry Costs

Table VII-8 depicts the aggregate industry investment and annualized costs for each of the treatment options considered for existing sources. These costs were developed from cost estimates presented in preceding sections of this chapter, information concerning the estimated number of plants by discharge status, type, and size presented in Table VII-1.

Table VII-2. The leather tanning industry, representative existing model plants, wastewater controls investment requirements

Existing direct dischargers (BAT)				
Model/size	Sub-category	BAT I	BAT II	BAT III
		($000)		
Chrome Tan	1 & 2			
Small		585	1,697	1,827
Large		1,046	2,906	3,187
Non Chrome Tan	3	291	613	691
Medium		753	1,789	1,988
Other				
Medium	4, 6, 7 & 8	184	203	357

Existing indirect dischargers (PSES)				
Model/size	Subcategory	PSES I	PSES II	PSES III
		($000)		
Chrome Tan/Pulp	1			
X-Small		301	633	1,063
Small		364	901	1,622
Medium		449	1,169	2,203
Large		586	1,572	3,046
X-Large		1,040	2,609	5,094
Chrome Tan/Save	2			
Small		350	1,006	1,745
Large		547	1,780	3,281
Nonchrome Tan	3			
Small		296	646	1,076
Medium		407	1,140	2,090
Large		609	1,813	3,475
Retan/Sides	4			
Small		143	805	805
Large		250	1,566	1,566
No Beamhouse	5			
Small		96	264	264
Medium		106	395	395
Large		123	618	618
Through Blue	6			
Small		299	716	1,554
Large		469	1,538	3,706
Shearling	7			
Small		135	707	707
Large		190	1,075	1,075
Pigskin				
Medium		473	1,478	2,717
Retan/Splits	9			
Small		122	655	655
Large		163	996	996

Source: U.S. Environmental Protection Agency, Effluent Guidelines Division.

Table VII-3. The leather tanning industry, representative new source model plants, wastewater controls investment requirements

Model/size	Sub-category	New source direct dischargers (NSPS)			New source indirect dischargers (PSNS)		
		NSPS I	NSPS II	NSPS III	PSNS I	PSNS II	PSNS III
		($000)					
Chrome Tan/Pulp	1						
Medium		1,805	2,654	2,834	409	1,095	2,105
Large		2,501	3,722	3,972	523	1,461	2,894
X-Large		4,044	6,158	6,556	848	2,354	4,720
Chrome Tan/Save	2						
Large		3,002	4,136	4,395	540	1,771	3,319
Nonchrome Tan	3						
Medium		1,884	2,647	2,812	387	1,105	2,062
Large		3,153	4,484	4,759	569	1,739	3,389
Retan/Sides	4						
Large		1,975	2,072	2,304	199	1,432	1,469
No Beamhouse	5						
Medium		605	631	689	102	390	409
Large		959	1,014	1,115	116	614	639
Through Blue	6						
Small		1,481	2,009	2,095	299	712	1,576
Large		3,862	5,068	5,284	469	1,484	3,757
Shearling	7						
Large		1,507	1,560	1,750	172	1,045	1,084
Pigskin	8						
Medium		2,630	3,471	3,671	441	1,416	2,641
Retan/Splits	9						
Large		1,424	1,552	1,715	154	992	1,028

Source: U.S. Environmental Protection Agency, Effluent Guidelines Division.

Table VII-4. The leather tanning industry, representative existing model plants, wastewater controls' annual operating and maintenance expenses

	Existing direct dischargers (BAT)			
Model/size	Sub-category	BAT I	BAT II	BAT III
		($000)		
Chrome Tan	1 & 2			
Small		119.0	268.5	271.5
Medium		395.5	892.5	898.5
Non Chrome Tan	3			
Small		72.0	154.5	157.5
Medium		318.5	587.5	592.0
Other	4, 6, 7 & 8			
Medium		105.5	158.0	162.0

	Existing indirect dischargers (PSES)			
Model/size	Subcategory	PSES I	PSES II	PSES III
		($000)		
Chrome Tan/Pulp	1			
X-Small		20.3	51.1	77.1
Small		35.1	76.8	135.3
Medium		62.5	124.0	242.2
Large		101.1	195.3	404.7
X-Large		236.9	449.4	1,008.4
Chrome Tan/Save	2			
Small		31.4	81.8	165.1
Large		88.8	224.8	521.4
Nonchrome Tan	3			
Small		18.9	50.5	80.1
Medium		50.4	112.7	233.6
Large		114.0	248.2	563.9
Retan/Sides	4			
Small		25.2	59.7	59.7
Large		98.0	165.9	165.9
No Beamhouse	5			
Small		5.2	27.7	27.7
Medium		8.4	34.1	34.1
Large		17.7	48.5	48.5
Through Blue	6			
Small		20.3	55.8	175.0
Large		68.7	171.2	844.5
Shearling	7			
Small		23.1	56.1	56.1
Large		50.5	91.1	91.1
Pigskin				
Medium		73.3	178.1	400.2
Retan/Splits	9			
Small		16.1	48.4	48.4
Large		37.3	82.6	82.6

Source: U.S. Environmental Protection Agency, Effluent Guidelines Division.

Table VII-5. The leather tanning industry, representative new source model plants, wastewater controls' annual operating and maintenance expenses

Model/size	Sub-category	New source direct dischargers (NSPS)			New source indirect dischargers (PSNS)		
		NSPS I	NSPS II	NSPS III	PSNS I	PSNS II	PSNS III
		($000)					
Chrome Tan/Pulp	1						
Medium		152	272	275	54	90	130
Large		239	454	459	93	149	211
X-Large		507	1,023	1,032	209	325	463
Chrome Tan/Save	2						
Large		267	498	504	99	171	244
Nonchrome Tan	3						
Medium		150	282	285	47	82	122
Large		331	676	682	109	180	257
Retan/Sides	4						
Large		167	234	239	46	89	97
No Beamhouse	5						
Medium		46	53	55	5	23	24
Large		71	92	95	12	37	36
Through Blue	6						
Small		107	176	179	19	39	76
Large		475	830	834	73	128	247
Shearling	7						
Large		126	154	158	32	62	68
Pigskin	8						
Medium		256	383	387	63	114	170
Retan/Splits	9						
Large		105	193	197	25	55	59

Source: U.S. Environmental Protection Agency, Effluent Guidelines Division.

Table VII-6. The leather tanning industry, representative existing model plants, wastewater controls' estimated annualized costs

Existing direct dischargers (BAT)					Existing indirect dischargers (PSES)				
Model/size	Sub-category	BAT I	BAT II	BAT III	Model/size	Subcategory	PSES I	PSES II	PSES III
				($000)					
Chrome Tan	1 & 2				Chrome Tan/Pulp	1			
Small		222.1	568.0	594.5	X-Small		73.6	163.1	265.3
Medium		580.2	1,406.0	1,461.8	Small		99.5	236.3	422.4
Non Chrome Tan	3				Medium		142.0	330.9	632.1
Small		123.9	262.8	279.6	Large		204.8	473.5	943.8
Medium		511.5	883.5	923.5	X-Large		421.0	911.2	1,910.0
Other	4, 6, 7 & 8				Chrome Tan/Save	2			
Medium		137.7	193.5	227.2	Small		93.4	259.9	474.0
					Large		185.6	539.9	1,102.1
					Nonchrome Tan	3			
					Small		71.3	164.8	270.6
					Medium		122.4	314.5	603.5
					Large		221.8	569.1	1,179.0
					Retan/Sides	4			
					Small		50.5	202.2	202.2
					Large		142.3	277.2	443.1
					No Beamhouse	5			
					Small		22.2	74.4	74.4
					Medium		27.2	104.0	104.0
					Large		39.5	157.9	157.9
					Through Blue	6			
					Small		73.2	182.5	450.1
					Large		151.7	443.4	1,500.5
					Shearling	7			
					Small		47.0	181.2	181.2
					Large		84.1	281.4	281.4
					Pigskin				
					Medium		157.0	439.7	881.1
					Retan/Splits	9			
					Small		37.7	164.3	164.3
					Large		66.2	258.9	258.9

Source: DPRA estimates based on annual operating and maintenance expenditures depicted in Table VII-6 and interest and depreciation expenses as described in Chapter VII.

Table VII-7. The leather tanning industry, representative new source model plants, wastewater controls' estimated annualized costs

Model/size	Sub-category	New source direct dischargers (NSPS) NSPS I	NSPS II	NSPS III	New source indirect dischargers (PSNS) PSNS I	PSNS II	PSNS III	PSNS IV
		($000)						
Chrome Tan/Pulp	1							
Medium		819	845	877	500	785	811	843
Large		1,264	1,301	1,345	753	1,230	1,266	1,311
X-Large		2,508	2,616	2,688	1,432	2,473	2,582	2,653
Chrome Tan/Save	2							
Large		1,286	1,318	1,366	927	1,252	1,284	1,332
Nonchrome Tan	3							
Medium		792	808	837	498	773	790	819
Large		1,600	1,646	1,695	948	1,566	1,612	1,660
Retan/Sides	4							
Large		622	653	694	341	588	619	660
No Beamhouse	5							
Medium		176	180	192	87	158	161	173
Large		289	298	317	135	271	280	299
Through Blue	6							
Small		553	557	573	371	535	538	555
Large		1,960	2,004	2,044	1,200	1,956	1,970	2,010
Shearling	7							
Large		422	440	475	241	388	406	441
Pigskin	8							
Medium		1,108	1,128	1,164	704	1,074	1,093	1,130
Retan/Splits	9							
Large		408	422	451	189	389	404	433

Source: DPRA estimates based on annual operating and maintenance expenditures depicted in Table VII-7 and interest and depreciation expenses as described on Page VII-6.

Table VII-8. The leather tanning industry, estimated aggregated costs for industry compliance with selected treatment options (1980 1st quarter and 1982 1st quarter dollars)

Existing direct dischargers (BAT)			Existing indirect dischargers (PSES)		
Treatment option	Total investment	Total annualized costs	Treatment option	Total investment	Total annualized costs
	----------($million)---------			---------($million)---------	
1980 dollars					
BAT Option I	8.8	4.8	PSES Option I	45.5	14.9
BAT Option II	23.6	11.1	PSES Option II	141.5	39.7
BAT Option III	26.3	11.6	PSES Option III	230.9	69.7
1982 dollars					
BAT Option I	10.5	5.7	PSES Option I	54.1	17.7
BAT Option II	28.1	13.2	PSES Option II	168.4	47.2
BAT Option III	31.3	13.8	PSES Option III	274.8	82.9

Source: DPRA estimates based on information provided in Tables VII-1. VII-2, and VII-6. 1982 costs are based on the 1980, 1st qtr. costs, inflated by the ENR-Construction Cost Index to 1982, 1st qtr. (factor of 1.19) Above figures are for all existing discharges (no exclusions).

VIII. PROJECTED ECONOMIC IMPACTS

The imposition of wastewater control requirements on the leather tanning industry will result in economic impacts for the industry because expenditures must be made that will not result in improved operating efficiency. Thus, the industry's average profitability will be reduced and economic impacts on some individual plants will be severe. As the capital and annual operating and maintenance expenditures for wastewater controls increase, the resulting economic impacts become more significant. The purpose of this chapter is to describe the various economic impacts associated with the treatment alternatives outlined in Chapter VII and to project the economic ramifications of tanneries incurring the associated expenditures.

The economic impacts of the various control alternatives were projected using the methodology discussed in Chapter II. The model plant approach was used to assess the impacts of PSES on the indirect dischargers. These impacts included plant closures, production and employment effect and secondary effects as outlined in Chapter II. For direct discharging tanneries, the impacts were based on an analysis of plant specific information, thus, plant closures, production and employment effects are based on plant specific information not on model plant data. The plant specific data were then aggregated and presented as model plants for presentation purposes and for the calculation of related secondary effects.

A. Price Effects

1. Increases in the Cost of Production

An implicit indicator of the expected cost effects attributable to the imposition of wastewater controls used in this analysis was the amount of sales price increase required to maintain a tannery's net present value, after control expenditures, at a level equal to that prior to control expenses. The method of the computation of this cost of production increase was described in detail in Chapter II (Methodology) of this report. The cost increases computed under this method reflect the time value of money and tax results as opposed to other more simplified methods, such as using annualized cost as percent of sales as a proxy of the increase. This latter method, which is frequently used, tends to overstate the increases required because it does not account for the tax implications. The ability of tanneries to pass on such cost increases is evaluated in the next section of this chapter.

The required price increases for models representing existing tanneries are shown in Table VIII-1 for the 3 BAT options and 3 PSES options. As shown for the direct discharger models, increases under BAT I are less than 2.5 percent for all models and range from 0.9 percent to a high of 2.3. Increases are about 20 percent higher under BAT II varying from 1.1 percent for the other model to 3.9 percent for the small Chrome Tan. Increases required under BAT III are only slightly higher than those under BAT II.

As shown for indirect dischargers, increases required under PSES I are, in most cases, less than two percent for small and X-small plants and less than one percent for medium and large plants. Three models require increases in excess of two percent: Chrome Tan/Pulp X-small (3.6); and Nonchrome Tan small (2.8); and the Pig medium (2.1). Under Technology PSES II, cost increases are more than double PSES I for most models. Increases range from 0.9 percent for the large Through Blue model to 5.3 percent for the small nonchrome tan model. Increases required under PSES III are substantially higher for all models except in those cases in which the two options have the same cost. The largest increases required are for the Chrome Tan/Pulp X-small and Pigskin medium models with required increases of 10.2 and 8.7 percent, respectively. All of the small models (except those for which PSES II and III are the same) require increases of over three percent.

2. Expected Price Increases

The leather tanning industry is an extremely competitive industry in which tanneries operate on relatively small profit margins. Primarily because of strong competition from foreign tanners, domestic tanners are expected to have a difficult time in passing on expenditures associated with wastewater controls. Another factor contributing to the expected lack of ability to increase prices would be the fact that individual tanneries would be affected differently, depending upon their respective size, levels of profitability, and magnitude of expenditure required. Thus, while some tanneries will require relatively large price increases, others will not.

Because of the BAT and PSES limitations nearly all tanneries are expected to realize a higher cost of production. Economic theory suggests that when increased costs are incurred throughout an industry (or among all producers), price increases will result over the long run. As a result, it is expected that over the long run prices will increase to cover the average increase in cost of production resulting from effluent controls of medium and large plants. The expected price increase was calculated by averaging the increases in the cost of production from the recommended options--BAT I and PSES II--for all medium, large and extra large plants as shown in Table VIII-1.

The required increases for the small plants were excluded from the averaging since the production of these plants amounts to a very small portion of the total industry output. Consequently, the upward pressure on prices from these plants would be insignificant. The required increase of the Pigskin plant was also excluded since it already has the recommended

Table VIII-1. The leather tanning industry, representative existing model plants, required price increase to offset expenditures for wastewater controls

Model/size	Subcategory	Existing direct dischargers (BAT) BAT I	 BAT II	 BAT III
		(percent)		
Chrome Tan	1 & 2			
Small		1.9	3.8	4.1
Large		1.7	3.9	4.1
Nonchrome Tan	3			
Small		2.3	4.5	5.0
Medium		2.1	2.9	3.1
Other	4, 6, 7 & 8			
Medium		0.9	1.1	1.4

Model/size	Subcategory	Existing indirect dischargers (PSES) PSES I	 PSES II	 PSES III
		(percent)		
Chrome Tan/Pulp	1			
X-Small		3.6	4.5	10.2
Small		1.8	4.4	7.8
Medium		1.1	2.6	5.0
Large		0.8	1.9	3.8
X-Large		0.5	1.2	2.5
Chrome Tan/Save	2			
Small		1.7	4.8	8.3
Large		0.7	2.2	4.3
Nonchrome Tan	3			
Small		2.8	5.3	7.6
Medium		0.9	2.4	3.3
Large		0.5	1.4	2.8
Retan/Sides	4			
Small		0.6	2.8	2.8
Large		0.3	1.1	1.1
No Beam House	5			
Small		1.5	2.6	2.6
Medium		0.6	2.1	2.1
Large		0.2	1.0	1.0
Through Blue	6			
Small		1.0	2.5	5.8
Large		0.6	0.9	2.1
Shearling	7			
Small		1.0	4.3	4.3
Large		0.6	2.4	2.4
Pigskin	8			
Medium		2.1	6.1	8.7
Retan/Splits	9			
Small		1.1	3.3	3.3
Large		0.6	2.6	2.6

treatment in place. The expected price increase is 1.8 percent. This expected price increase is not used in projecting plant closures, production effects, or employment effects. The use of this price increase would reduce the magnitude of these other effects.

B. Financial Effects

Based on the model tannery profiles described in Chapter VI and the estimated cost of wastewater control costs described in Chapter VII, the following financial indicators were computed for the base case (without wastewater controls considered) and the impacted case (with wastewater controls considered).

- After-Tax Return on Sales
- After-Tax Return on Total Assets
- Annual Cash Flow
- Net Present Value

These indicators were computed for each tannery model according to the net present value (NPV) methodology and accounting procedures outlined in Chapter II, Methodology. It should be noted that unlevel discounted cash flows were used in determining the models' NPVs. That is, for each of the twenty-one years, independent cash flows were computed based on certain assumptions of inflation, profitability, depreciation, and reinvestment. Accordingly, the after-tax returns on sales and total assets varied slightly from year to year. To compensate for this, a 21-year average was computed for each return. Since the model tanneries' annual cash flow values varied from year to year, the cash flow for year 21 was presented (cash flows for year 10 and 15 were also examined). Use of the cash flow from year 21, after a full cycle of construction and use of pollution control equipment, provides for another measurement of profitability over the long term. Short term cash flows indicating the firms liquidity are also used to estimate plant closures (See Chapter II, Section F). Because of the above described procedures, the base case financial indicators may differ slightly from similar indicators presented in Chapter VI, Model Plants.

1. Return on Sales

After-tax return on sales reflects the general level of profitability in an industry. For the leather tanning industry, returns on sales have been low for the past few years due to a general decline in the industry. The imposition of wastewater control requirements on the industry contributes to a further deterioration of its returns.

The after-tax returns on sales for the existing model tanneries both before and after expenditures for wastewater controls are shown in Table VIII-2. Table VIII-3 indicates the corresponding percent reductions in income. Under BAT I, the return of the small Chrome Tan model is a negative 0.8 percent (loss). The returns for the other models range between 0.5 percent

Table VIII-2. The leather tanning industry, representative existing model plants, effects of wastewater control expenditures on average after-tax returns on sales

Existing direct dischargers (BAT)

Model/size	Subcategory	Base case	BAT I	BAT II	BAT III
		(percent)			
Chrome Tan	1 & 2				
Small		1.2	-0.8	-3.8	-4.0
Large		5.1	4.1	2.7	2.6
Nonchrome Tan	3				
Small		2.7	1.6	-0.1	-0.3
Medium		1.9	0.5	-1.0	-1.1
Other	4, 6, 7				
Medium	& 8	2.4	1.8	1.6	1.5

Existing indirect dischargers (PSES)

Model/size	Subcategory	Base case	PSES I	PSES II	PSES III
		(percent)			
Chrome Tan/Pulp	1				
X-Small		3.2	1.6	-1.0	-4.2
Small		3.2	2.5	1.3	-0.8
Medium		2.8	2.3	1.7	0.4
Large		2.3	1.9	1.5	0.4
X-Large		2.6	2.3	2.0	1.3
Chrome Tan/Save	2				
Small		3.1	2.4	0.9	-1.7
Large		2.3	2.0	1.3	-0.1
Nonchrome Tan	3				
Small		2.8	1.6	-0.7	-3.6
Medium		2.0	1.6	1.0	-0.3
Large		2.3	2.0	1.7	0.9
Retan/Sides	4				
Small		2.0	1.7	0.8	0.8
Large		2.0	1.9	1.6	1.6
No Beam House	5				
Small		3.6	3.0	1.2	1.2
Medium		2.9	2.7	2.0	2.0
Large		2.4	2.3	2.0	2.0
Through Blue	6				
Small		2.8	2.4	1.8	-0.2
Large		1.9	1.8	1.5	0.5
Shearling	7				
Small		3.3	2.8	1.4	1.4
Large		3.2	2.8	2.2	2.2
Pigskin	8				
Medium		3.5	2.6	0.5	-4.4
Retan/Splits	9				
Small		2.3	1.8	-0.5	-0.5
Large		2.2	1.8	1.0	1.0

Table VIII-3. The leather tanning industry, representative existing model plants' impacts, percent reductions in average after-tax return on sales due to wastewater control expenditures

Model/size	Subcategory	Existing direct dischargers (BAT) BAT I	 BAT II	 BAT III
		(percent)		
Chrome Tan	1 & 2			
Small		>100.0	>100.0	>100.0
Large		20.0	46.9	47.8
Nonchrome Tan	3			
Small		40.2	>100.0	>100.0
Medium		76.6	>100.0	>100.0
Other	4, 6, 7 & 8			
Medium		27.2	37.2	43.1

Model/size	Subcategory	Existing indirect dischargers (PSES) PSES I	 PSES II	 PSES III
		(percent)		
Chrome Tan/Pulp	1			
X-Small		49.1	>100.0	>100.0
Small		23.5	60.0	>100.0
Medium		17.7	40.2	86.3
Large		16.8	37.3	82.5
X-Large		11.1	23.2	49.4
Chrome Tan/Save	2			
Small		22.8	70.5	>100.0
Large		15.3	43.3	>100.0
Nonchrome Tan	3			
Small		44.4	>100.0	>100.0
Medium		19.7	50.9	>100.0
Large		11.3	27.9	60.9
Retan/Sides	4			
Small		15.0	60.0	60.0
Large		8.4	22.4	22.4
No Beam House	5			
Small		16.6	67.2	67.2
Medium		7.7	30.0	30.0
Large		4.3	16.1	16.1
Through Blue	6			
Small		13.8	35.7	>100.0
Large		6.9	19.5	74.9
Shearling	7			
Small		14.7	56.3	56.3
Large		10.3	30.2	30.2
Pigskin	8			
Medium		28.1	86.4	>100.0
Retan/Splits	9			
Small		23.7	>100.0	>100.0
Large		14.2	52.6	52.6

to 4.1 percent. The reductions in income are 20 percent or greater for all models. Under BAT II, three models have negative returns. Those of the remaining two models are 2.7 percent for the large Chrome Tan model and 1.6 percent for the Other model. The returns of all models are slightly lower under BAT III than under BAT II.

In the case of PSES, the returns ranged from 1.6 percent to 3.0 percent under PSES I. The reductions in income from baseline ranged from 4 percent to 50 percent. Under PSES II, reductions were significantly higher than those under PSES I--two to four times as high. Three of the models had negative returns: the X-small Chrome/Tan Pulp, the small Nonchrome Tan, and the small Retan/Splits. The other returns ranged from 0.5 percent to 2.2 percent.

2. Return on Total Assets

Due to the relative age of most tanneries, their respective assets were acquired at considerably less cost than if acquired today. Accordingly, the model tanneries' average returns on total assets were relatively high in the base case. This is especially true for X-small and small tanneries. The imposition of wastewater controls affected the plants in the same manner as was described for the return on sales; thus, the models' returns on total assets would be reduced by approximately the same percentages. As such, a detailed description of the reductions in the returns on total assets for each model was not developed. The 21-year average returns on total assets are shown in Table VIII-4 for the existing model tanneries. It should be noted the returns shown are averages of each of the model's 21-years' returns on total assets; thus, some slight differences of the percentage reductions between the returns on total assets may be noted.

3. Annual Cash Flows

The annual cash flows for year 21 are shown in Table VIII-5 for the existing models, both direct and indirect dischargers. For the direct dischargers, the cash flows are all positive under BAT I, ranging from $200,000 to close to $4 million. Under BAT II, the cash flow of the small Chrome Tan model becomes negative. The others remain positive but are substantially less than those under baseline. The cash flows of the indirect discharge models all remain positive, both under PSES I and II. The cash flows under PSES I are only slightly lower than those under baseline. They range from a low of about $180,000 to a high of over $6 million. Under PSES II, the cash flows are reduced from about 25 to 35 percent from baseline and range from just over $130,000 to close to $6 million (for the X-large Chrome Tan/Pulp model).

4. Net Present Values

The model plant net present values (NPV) reflect the net present values of the model tanneries discounted over a 21 year period. The NPV concept indicates the size of the return to the equity holders in excess of the firm's cost of capital (11.0 percent - see Chapter IV, Section F); thus, if

Table VIII-4. The leather tanning industry, representative existing model plants, effects of wastewater control expenditures on average after-tax returns on total assets

Existing direct dischargers (BAT)					
Model/size	Subcategory	Base case	BAT I	BAT II	BAT III
		(percent)			
Chrome Tan	1 & 2				
Small		6.5	-4.2	-14.5	-15.0
Large		23.5	17.5	10.4	10.0
Nonchrome Tan	3				
Small		17.0	9.0	-1.3	-2.4
Medium		8.7	2.0	-4.7	-5.1
Other	4, 6, 7 & 8				
Medium		11.0	7.8	6.7	6.0

Existing indirect dischargers (PSES)					
Model/size	Subcategory	Base case	PSES I	PSES II	PSES III
		(percent)			
Chrome Tan/Pulp	1				
X-Small		16.6	7.4	-1.8	-9.8
Small		15.8	10.9	5.4	-1.1
Medium		16.2	12.4	8.3	2.4
Large		10.8	8.6	6.1	1.8
X-Large		9.3	8.1	6.8	4.2
Chrome Tan/Save	2				
Small		14.9	10.4	3.9	-4.0
Large		10.6	8.7	5.4	0.0
Nonchrome Tan	3				
Small		18.3	8.4	-1.8	-10.8
Medium		11.7	8.8	5.0	-0.9
Large		8.1	7.0	5.5	2.8
Retan/Sides	4				
Small		8.0	6.6	2.9	2.9
Large		9.2	8.3	6.7	6.7
No Beam House	5				
Small		16.9	13.0	4.9	4.9
Medium		12.9	11.5	8.1	8.1
Large		10.0	9.4	7.9	7.9
Through Blue	6				
Small		18.2	14.5	10.0	0.4
Large		13.4	12.2	10.0	2.9
Shearling	7				
Small		11.0	9.0	4.2	4.2
Large		10.2	9.0	6.5	6.5
Pigskin	8				
Medium		21.7	13.7	3.0	-13.0
Retan/Splits	9				
Small		12.4	8.9	-0.7	-0.7
Large		12.5	10.4	5.2	5.2

Table VIII-5. The leather tanning industry, representative existing model plants, effects of wastewater control expenditures on annual cash flows (year 21)

Existing direct dischargers (BAT)					
Model/size	Subcategory	Base case	BAT I	BAT II	BAT III
		($000)			
Chrome Tan	1 & 2				
Small		498	229	-240	-261
Large		4,500	3,797	2,894	2,874
Nonchrome Tan	3				
Small		483	351	194	184
Medium		1,418	843	198	175
Other	4, 6, 7 & 8				
Medium		948	1,132	859	847

Existing indirect dischargers (PSES)					
Model/size	Subcategory	Base case	PSES I	PSES II	PSES III
		($000)			
Chrome Tan/Pulp	1				
X-Small		247	202	138	58
Small		638	566	477	352
Medium		1,264	1,143	1,013	777
Large		2,148	1,957	1,763	1,358
X-Large		6,683	6,247	5,833	4,803
Chrome Tan/Save	2				
Small		606	541	433	266
Large		2,109	1,940	1,666	1,113
Nonchrome Tan	3				
Small		229	187	121	18
Medium		1,001	902	771	533
Large		3,730	3,516	3,247	2,656
Retan/Sides	4				
Small		621	573	491	491
Large		3,383	3,209	3,048	3,048
No Beam House	5				
Small		191	179	135	135
Medium		516	498	444	444
Large		1,512	1,477	1,408	1,408
Through Blue	6				
Small		789	744	670	439
Large		3,308	2,906	2,695	1,484
Shearling	7				
Small		526	482	406	406
Large		1,353	1,261	1,161	1,161
Pigskin	8				
Medium		824	684	472	-77
Retan/Splits	9				
Small		285	253	180	180
Large		839	770	664	664

the NPV was positive, it is assumed the particular firm earns a return during the 21 year period in excess of the minimum return necessary to attract investors to the tanning industry (the cost of capital). If the NPV is negative, then the firm's returns are less than the average industry cost of capital.

The NPV's for existing models are shown in Table VIII-6. Under BAT I, two models have negative NPVs: the small Chrome Tan and the medium Nonchrome Tan. Under BAT II, the NPV of the small Nonchrome model becomes negative in addition to those of the other two models. The NPVs under BAT III are only slightly lower than those under BAT II.

Under PSES I, three indirect discharge models have negative NPVs: the X-large Chrome Tan Pulp, the large Nonchrome Tan, and the small Retan/Sides; the Nonchrome Tan model also had a negative NPV under baseline. Under PSES II, the NPVs are considerably lower than those under PSES I; however, no additional plant's NPVs become negative. PSES III increases the negative NPVs to include; the large Chrome Tan/Pulp, the large Chrome Tan/Save, the remaining Nonchrome Tan and the Pigskin model.

C. Production Effects

The leather tanning industry is experiencing a long term decline which began in the early 1960's and has continued through 1982 except for short periods in 1975-76 and 1981. Volume in 1960 was 38 million hides; production in 1981 had declined to under 20 million hides representing an average annual decline of approximately 3 percent.

There are 158 wet tanneries in the industry today. Thirty-one percent of the tanneries are categorized as large (or extra-large) and handle approximately 68 percent of the industry's volume. Twenty-one percent of the tanneries are categorized as medium and process an estimated 19 percent of the volume. The remaining 68 tanneries are small or extra-small operations which as an aggregate produce only 13 percent of the total industry volume.

1. Baseline Plant Closures

According to the records of the Tanners' Council of America, 45 tanneries ceased operations between 1968 and 1975. After remaining stable through the 70's, several tanneries have closed (and one burned) in the last few years. The reasons for these closures vary; however, some of the more important factors included:

- increased international competition
- increased production of synthetic leather
- higher per unit cost of production in some plants -- especially the smaller size
- lower per unit profit
- difficulty in meeting (physically and financially) occupational safety requirements
- plant obsolescence

Table VIII-6. The leather tanning industry, representative existing model plants, effects of wastewater control expenditures on net present values

Existing direct dischargers (BAT)					
Model/size	Subcategory	Base case	BAT I	BAT II	BAT III
		($000)			
Chrome Tan	1 & 2				
Small		341	-403	-1,420	-1,468
Large		9,154	6,952	4,058	3,964
Nonchrome Tan	3				
Small		897	472	-11	-44
Medium		727	-1,106	-2,572	-2,641
Other	4, 6, 7 & 8				
Medium		2,989	2,424	2,160	2,103

Existing indirect dischargers (PSES)					
Model/size	Subcategory	Base case	PSES I	PSES II	PSES III
		($000)			
Chrome Tan/Pulp	1				
X-Small		671	491	248	6
Small		1,506	1,247	916	459
Medium		2,935	2,521	2,049	1,223
Large		1,975	1,338	642	-737
X-Large		1,383	-32	-1,448	-4,795
Chrome Tan/Save	2				
Small		1,430	1,194	792	207
Large		1,905	1,338	378	-1,440
Nonchrome Tan	3				
Small		610	444	202	-51
Medium		1,420	1,076	597	-223
Large		-920	-1,626	-2,571	-4,521
Retan/Sides	4				
Small		145	-13	-338	-338
Large		1,976	1,432	790	790
No Beam House	5				
Small		500	447	284	284
Medium		918	852	658	658
Large		1,256	1,140	872	872
Through Blue	6				
Small		2,106	1,935	1,663	878
Large		8,061	7,612	6,856	3,017
Shearling	7				
Small		881	735	439	439
Large		1,992	1,698	1,291	1,291
Pigskin	8				
Medium		1,924	1,451	699	-689
Retan/Splits	9				
Small		496	384	86	86
Large		1,297	1,074	656	656

- inadequate owner income
- owner retirement
- unable to meet state environmental regulations

It is anticipated that additional tanneries will close in the future for similar reasons. Accordingly, it is estimated that approximately 7-12 tanneries will close prior to 1984 barring any atypical changes in the industry's operating environment. Expected baseline closures include one direct discharging tannery and the following indirects:

• Chrome Tan/Pulp	2-4
• Chrome Tan/Save	1
• Nonchrome Tan	2-3
• Retan/Sides	1-2
• Retan Splits	1-2

While tanneries are projected to close, new tanneries are also expected to be constructed prior to 1984. These new tanneries are expected to number about 3-5 and will probably be relatively large operations in the Chrome Tan or Through Blue categories.

2. Plant Closure Criteria

Based on the assumption of no price increases, the industry's production effects resulting from the imposition of wastewater controls are best measured in terms of the possibility of tanneries closing due to the imposition of effluent control costs. As was discussed in Chapter II, plant closures may result from the inability of less profitable plants to adequately recover required pollution abatement costs through increased product price. Plant closures for direct discharging facilities are analyzed in a confidential report, since plant specific financial data is used. The methodology, however, is the same as that used for our analysis of indirect dischargers.

The closure analysis for indirect dischargers consists of two major steps. First we determine which model plants appear to be potential closures. This is done using the NPV/cash flow measure of profitability and the liquidity test. The second step is to determine the number of plants represented by the model that would actually close. Both these steps are presented in detail in Chapter II.

a. The Net Present Value/Cash Flow Test - Indirect Dischargers

The NPV/cash flow test is based on the present value of future cash flows discounted at a rate equal to the industry cost of capital. Thus, if a firms net present value (after controls) exceeds its cost of capital it is in the firms best interest to continue operations. Following are the results of the NPV/cash flow test.

Model/Size	NPV/Cash Flow Test			
	Subcategory	PSES I	PSES II	PSES III
Chrome Tan/Pulp	1			
Large				M
X-Large		M	M	M
Chrome Tan/Save	2			
Large				C
Nonchrome Tan	3			
Small				C
Medium				M
Large		M	M	C
Retan/Sides	4			
Small		M	M	M
Pigskin	8			
Medium				C

M = Marginal
C = Closure

b. Liquidity Test - Indirect Dischargers

The liquidity test considers the firms ability to make the necessary investment in pollution control facilities and repay its debt obligation. This test considers the short-term (5 year) cash flow of the model plant immediately following implementation of the control in contrast to the 21 year cash flow which examines longer term profitability. If the liquidity test is negative the model plant can be expected to have difficulty financing the necessary expenditures.

The results of the liquidity test are combined with the results of the NPV/cash flow test in the way described on page II-15 and are shown in Table VIII-7. The combination of these tests is an attempt to simulate the decision process of the firms owner. Is it economically viable to continue operations? If so, can the pollution control expenditures be financed?

3. Estimated Tannery Closures

The individual plant analysis conducted for the 17 direct dischargers projects the closure of two tanneries under BAT I. Under BAT II and III six tanneries are expected to close.

Table VIII-7. Results of the net present value/cash flow test and the liquidity test, indirect dischargers

	PSES I			PSES II			PSES III		
	NPV/Cash Flow	Liquidity Test	Status	NPV/Cash Flow	Liquidity Test	Status	NPV/Cash Flow	Liquidity Test	Status
Chrome Tan/Pulp									
X-Small		Neg	M		Neg	M		Neg	M
Small		Pos	V		Neg	M		Neg	M
Medium		Pos	V		Pos	V		Pos	V
Large		Pos	V		Pos	V	M	Pos	M
X-Large	M	Pos	M	M	Pos	M	M	Pos	M
Chrome Tan/Save									
Small		Pos	V		Neg	M		Neg	M
Large		Pos	V		Pos	V	C	Neg	C
Nonchrome Tan									
Small		Pos	V		Neg	M	C	Neg	C
Medium		Pos	V		Pos	V	M	Neg	C
Large	M	Pos	M	M	Pos	M	C	Pos	C
Retan/Sides									
Small	M	Pos	M	M	Pos	M	M	Pos	M
Large		Pos	V		Pos	V		Pos	V
No Beamhouse									
Small		Pos	V		Pos	V		Pos	V
Medium		Pos	V		Pos	V		Pos	V
Large		Pos	V		Pos	V		Pos	V
Through Blue									
Small		Pos	V		Pos	V		Pos	V
Large		Pos	V		Pos	V		Pos	V
Shearling									
Small		Pos	V		Pos	V		Pos	V
Large		Pos	V		Pos	V		Pos	V
Pigskin									
Medium		Pos	V		Neg	M	C	Neg	C
Retan/Splits									
Small		Pos	V		Neg	M		Neg	M
Large		Pos	V		Pos	V		Pos	V

As discussed in Chapter II, Section F, once the model closure criteria have been developed the second step is to determine the actual number of plant closures that are associated with each model. This includes some qualitative judgement associated with the following factors:

a. the number of existing facilities associated with the model,

b. the degree to which existing facilities already have controls in place,

c. historical trends for the subcategory (baseline closures),

d. the severity by which the models financial data are reduced, in particular, the conventional financial parameters, after-tax rate of return on sales and assets,

e. the distribution of financial profiles of existing facilities associated with the model plant, and

f. consideration of the reliability of the data utilized in the development of the model plants.

A summary of the key indicators under PSES II is presented in Table VIII-8. For the indirect dischargers, the plant closure analysis projects that from 10 to 15 plants may close under PSES II. This is discussed by subcategory below.

Chrome Tan/Pulp - The x-small and small plants in this category are having baseline difficulties due to overcapacity and price competition in the industry. As a result, 1-2 baseline closures are projected in each size category.

The X-small chrome tan plants will be very severely impacted with an estimated production cost increase of 4.5 percent, a drop in the conventional financial parameters (rate of return on sales and on assets) and negative cash flow assuming 5-year financing. As a result all X-small chrome tan plants are projected to close.

The small chrome tan plants will also incur a high production cost increase due to the impact of PSES II. Profits will be reduced by an estimated 60 percent and the 5-year liquidity test indicates a slightly negative cash flow. Over the long run the plants are expected to be profitable but it is expected that 1-2 of the 20-21 plants remaining after baseline closures will close and 6 will be included in the marginal category. These, of course, will be the plants that are achieving lower profits than those indicated by the model plants.

Economic impacts on the medium, large and X-large plants are not expected to result in plant closures. Conventional financial parameters are reduced from 20-40 percent but the NPV and liquidity tests remain positive. Three of the large plants and two of the X-large plants are expected to become marginal. Again, these plants would have a lower level of baseline profitability than indicated by the model plants.

Table VIII-8. Summary of key indicators for PSES II

Model/Size	Subcategory	Number of plants	Number of employees per plant	PC inv	PC O&M	Annual cost	Production cost increase	Model viability	Facilities in place	Baseline closures	Severity impacts on profits 1/	No. of closures	No. of marginal	Employees lost
Chrome Tan/Pulp	1													
X-Small		6	40	633	51	163	4.5	M	Low	1-2	V High	4-5	-	160-200
Small		22	100	901	77	236	4.4	M	Low	1-2	High	1-2	6	100-200
Medium		12	165	1,169	124	331	2.6	V	Low		Mod	-	-	
Large		11	355	1,572	115	473	1.9	V	Low		Mod	-	3	
X-Large		5	570	2,609	449	910	1.2	M	Low		Low	-	2	
Chrome Tan/Save	2													
Small		3	80	1,006	82	260	4.8	M	Low	1	High	-	1	
Large		2	390	1,780	225	540	2.2	V	Low		Mod	-	1	
Nonchrome Tan	3													
Small		3	45	646	51	165	5.3	M	Low	0-1	V High	1-2	1	45-90
Medium		4	140	1,140	113	315	2.4	V	Low	1	High	-		
Large		1	270	1,813	248	569	1.4	M	Low	1	Mod	-		
Retan/Sides	4													
Small		8	105	865	60	202	2.8	M	Low	1-2	High	0-1	2	0-105
Large		7	410	1,566	166	277	1.1	V	Low		Mod	-		
No Beamhouse	5													
Small		7	25	264	28	74	2.6	V	Low		High	-		
Medium		7	70	395	34	104	2.1	V	Low		Mod	-		
Large		10	215	8	49	158	1.0	V	Low		Low	-		
Through Blue	6													
Small		7	65	716	56	183	2.3	V	Low		Mod	-		
Large		5	275	1,538	171	443	0.9	V	Low		Low	-		
Shearling	7													
Small		3	65	707	56	181	4.3	V	Low		High	-		
Large		3	220	1,075	91	281	2.4	V	Low		Mod	-		
Pigskin	8													
Medium		1	210	1,478	178	440	6.1	M	High		V High	-		
Retan/Splits	9													
Small		9	70	665	48	165	3.3	M	Low	1-2	V High	4-5		280-350
Large		5	190	996	83	259	2.6	V	Low		High			
Total		141										10-15		585-945

1/ Reflects baseline profits reduced by the following amounts: Low, ≤25%; Mod, 26-50%; High, 51-75%; Very High >75%.

Chrome Tan/Save: The Agency is projecting one baseline closure among the three small chrome tan plants. The imposition of controls will result in one of the two remaining plants becoming marginal. Even though the conventional financial parameters for the models remain positive, possible difficulty in financing the control and reduction in the conventional financial parameters (70 percent) will result in the marginal plant. Also, one of the two plants represented by the large model is expected to become marginal due to a combination of moderate financial impacts and a reduction in the NPV from a baseline of $1,905,000 to $378,000.

Nonchrome Tan: Two to three baseline closures are expected in this category and are expected in at least two size categories. These baseline closures will leave the remaining plants in a slightly stronger position due to the decrease in production capacity. The small nonchrome plants will experience a very high 5.3 p.c. increase in the cost of production and result in very high financial impacts including a negative cash flow after imposition of controls. As a result, we expect 1-2 plants in this category will close due to financing difficulty with two of the remaining plant becoming marginal.

The medium and large plants are expected to have profits reduced as indicated by the decline in conventional financial parameter but should be able to finance the control investments as the liquidity tests are positive.

Retan/Sides: The retan subcategories are in baseline difficulty because of a decline in demand for their products. This is reflected in the one - two baseline closures. It is possible that one additional small plant may choose to close because of the low NPV. The financial parameters including the liquidity test are positive; however, there are considerable variations in the baseline financial condition of plants. Two additional small plants are expected to become marginal. The large plants are projected to remain viable after the imposition of control.

No Beamhouse: Our model plant analysis as well as an assessment of other factors indicate that plants within this subcategory will remain viable.

Through Blue: Again, the model plant analysis and assessment of other factors indicate that plants within this subcategory will remain viable.

Shearling: No baseline closures are projected nor are any of the plants expected to close due to compliance with PSES II.

Pigskin: The single pigskin plant represented by the model is not expected to close because a substantial portion of the treatment facilities and equipment is in place. This in-place equipment was not reflected in the cost estimates presented in Chapter VII.

Retan/Splits: This subcategory is presently in difficulty due to a change in consumer tastes and one to two baseline closures are likely in the small category. Our analysis indicate a very severe economic impact on the small plants. The model fails to pass the liquidity test by a wide margin and the conventional financial parameters as averaged over the life of the project are negative. This indicates financing difficulty and we are forecasting from four to five closures in the size subcategory. The large plant will be in a stronger financial position and should continue to operate profitably.

Employment effects: The individual plant analysis conducted for the 17 direct dischargers project the closure of two tanneries under BAT Option I, the selected option. This will result in an employment loss of 155 workers.

For the indirect dischargers, from 10 to 15 plants are projected to close under PSES II. This would result in an employment loss of 585 to 945 employees. These data are summarized in Table VIII-8.

Production effects: The production displacements associated with the estimated closures discussed above are contained in Table VIII-9 for BAT I and PSES II. The BAT I requirements are expected to result in a displacement of close to 12 million square feet of finished leather which amounts to about 10 percent of the total finished product of the direct dischargers. PSES II requirements are expected to result in displacement of between 29.6 and 46.8 million square of leather. This represents from 1.8 to 2.8 percent of the total leather production of the indirect dischargers. The most significant impact will occur in the Retan/Splits subcategory. The large number of closures in this subcategory would result in a displacement of from 16.4 to 20.5 percent of the splits production. This impact could be expected to cause some short-term turbulence in the splits markets. Displacements in the other subcategories are relatively minor and can be expected to be absorbed by other tanneries remaining in operation.

D. Secondary Production Effects

The impact of effluent control will increase the overall cost of production on an industry wide basis. As a result it is likely that the industry will be able to pass some of these costs through the consumers of leather products. However, if prices are increased then secondary impacts can be expected in the volume of leather and leather products purchased (See Chapter V, Section A.3.) For purposes of this report, the financial analysis was concluded assuming no price increase (worst case). Likewise, no declines in sales were assumed due to lower production costs. The following discussion is indicative of what may occur in the secondary round of production effects.

Table VIII-9. Summary of production displacement - options BAT I and PSES II

Model/Size	Subcategory	Annual production displaced	Percent of subcategory displaced	Percent of 1/ total discharge category displaced
Direct Dischargers - BAT I				
Chrome Tan	1 & 2	(1,000 hides)		
Small		73	10.0	6.2
Other	4, 6, 7 & 8	(1,000 skins)		
Medium		500	20.0	3.2
Total (BAT) (1000 square feet)		11,833	--	9.6
Indirect Dischargers - PSES II				
Chrome Tan/Pulp	1	(1,000 hides)		
X-Small		160-200		
Small		100-200		
(Subcategory Total)		260-400	1.6-2.5	0.7-1.0
Nonchrome Tan	3	(1,000 hides)		
Small		35-75	2.7-5.3	0.1-0.2
Retan/Sides	4	(1,000 sides)		
Small		0-270	0-2.2	0.0.3
Retan/Splits	9	(1,000 splits)		
Small		2160-2700	16.4-20.5	1.0-1.3
Total (PSES) (1000 square feet)		29,550-46,700	-	1.8-2.8

1/ Based on square feet.

As developed in Chapter V, Section A.3, a one percent increase in the price of leather will have the following cumulative effect on domestic leather producers.

Type of impact	Effect on domestic producers Percent
Imports of shoes	-0.28
Imports of leather goods	-0.14
Imports of leather	-0.26
Impact on leather exports	-0.21
Total effects (best case)	-0.89

The EPA model calculates the average price increase required to keep the net present value of the firm, after controls, equal to baseline conditions. This was averaged over a 5 year planning period. The increases that are likely to occur in the market are unlikely to be as large as the price increase that would be required for small plants to keep profits constant. Thus, the required price increases resulting from the recommended options were averaged for medium and large sized plants. This amounted to a long term price increase of 1.8 percent.

On this basis, the combined effect of an increase in the price of domestically produced leather on leather imports and shoe imports, and hence on reducing domestic leather demand is estimated as follows:

Increase in domestic leather price	Reduction in demand for domestically produced leather, based on import elasticity values		
	Low	Best	High
1.0%	0.35	0.89	1.45
1.8%	0.64	1.60	2.62
2.5%	0.89	2.23	3.64

A reasonable estimate of the reduction in leather demand would be in the range of 0.64 to 2.62 percent with the best estimate of 1.60. Over the past 12 years, the average decline in domestic leather output has been approximately 3 percent per year.

E. Community Effects

As shown in Table III-3, over 70 percent of the tanneries are located either in the Northeast or North-Central region. These tanneries are estimated to be distributed fairly evenly among large urban areas (Milwaukee, St. Louis, Chicago), towns of about 40,000 to 50,000 population (Peabody, Massachusetts), and small towns of between 1,000 to 2,000 population (Hartland, Maine; Westfield, Pennsylvania). Of the tanneries projected to close, most employ less than 100 workers. A closing of a tannery of this size could be expected to have a significant impact on a small town with a population of 1,000 to 2,000; however, the impact on a larger town or urban area would be relatively minor. The closing of two or more in a town of 40,000 to 50,000 could be expected to have an appreciable impact on these towns. Assuming that the distribution of tannery closures follows the distribution pattern indicated above, pollution control can be expected to have severe impacts on 3 to 5 small towns.

F. Balance of Payments Effect

On the basis of the assumptions used in Chapter VIII - Section F we can estimate the net effect on the U.S. balance of payments.

A one percent increase in the domestic price of leather can increase the leather-leather products balance of payments by $21.9 million (best estimate) annually. Thus an expected price increase of 1.8 percent will effect the balance of payments by $39.4 million with a possible range of $15.8 to $64.5 million.

G. New Source Effects

The Agency is establishing standards for new sources equal to those for existing sources. There is no incremental cost or economic effect for a new source to enter the industry over and above the costs that must be incurred by existing plants.

IX. SMALL BUSINESS ANALYSIS

The Regulatory Flexibility Act passed by the 96th Congress requires that Federal agencies consider the differences in the scale of resources of regulated entities. The purpose of this chapter is to summarize the information contained elsewhere in the report relative to the Regulatory Flexibility Act and present the impacts on "small" plants and firms in a concise statement.

A. Definition of "Small" Leather Tanning and Finishing Plants

The first step in completing the regulatory flexibility analysis is to define small entities for each subcategory. The definition of small, medium and large sized plants as used in this report was developed jointly between representatives of the Tanners Council of America, EPA, the technical contractor and the economic contractor. It was agreed that this size categorization reasonably represented the size structure of the industry and was adapted for use in this study. This definition was originally developed in EPA's 1973 report entitled Economic Analysis of Proposed Effluent Guidelines: Leather Tanning and Finishing Industry as developed by DPRA. It was modified and expanded to include new subcategories, with the last modification occurring in 1980. While it is believed the size structure used as a basis of Chapters VI, VII and VIII more correctly characterizes the industry, the Small Business Administration (SBA) definition is used for purposes of the Regulatory Flexibility Analysis.

The SBA has proposed a definition of "small" leather tanning and finishing firms as those firms with 200 or fewer employees (Federal Register Vol. 47, No. 85.) This definition is used herein to distinguish "small" from "large". A minor problem should be mentioned. The SBA definition is applicable to firms whereas the analysis in this report is based upon plants. The 1977 Census of Manufactures lists 427 companies in the leather tanning and finishing industry and 465 plants, indicating that most firms (85-90 percent) in the industry are single plant firms. 1/ As a result the SBA definition can adequately serve for this purpose.

The industry structure for direct and indirect dischargers is shown on Table IX-1 with the corresponding proposed SBA classification.

1/ Note: excluding converters and plants with under 20 employees there were 181 plants reported in 1977. See Chapter III Section A for further discussion.

Table IX-1. Proposed small plant classification, leather tanning and finishing industry

Model/size	Subcategory	Number of plants	Number of employees per plant	Proposed SBA classification	Daily capacity	Annual sales $1,000
Direct Dischargers						
Chrome Tan	1 & 2				Hides	
Small		2	90	Small	800	8,050
Medium		2		Small	No data available	
Large		3	180	2 small 1 large	1,500	16,099
Nonchrome Tan	3				Hides	
Small		3	45	Small	210	4,341
Large		2	250	Large	715	14,469
Other	4,6,7,8				Skins	
Small		2	65	Small	No data available	
Medium		2	55	Small	2,500	5,792
Large		1	135	Small	No data available	
Total direct dischargers		17		14 small 3 large		
Indirect Dischargers						
Chrome Tan/Pulp	1				Hides	
X-Small		6	40	Small	175	1,730
Small		22	100	Small	500	4,326
Medium		12	165	Small	1,000	9,734
Large		11	355	Large	2,000	18,386
X-Large		5	570	Large	5,400	52,561
Chrome Tan/Save	2				Hides	
Small		3	80	Small	500	4,326
Large		2	390	Large	2,000	18,386
Nonchrome Tan	3				Hides	
Small		3	45	Small	150	2,066
Medium		4	140	Small	750	10,326
Large		1	270	Large	2,200	30,294
Retan/Sides	4				Sides	
Small		8	105	Small	1,350	5,840
Large		7	410	Large	6,600	32,121
No Beamhouse	5				Skins	
Small		7	25	Small	900	1,299
Medium		7	70	Small	2,700	3,896
Large		10	215	Large	8,600	13,139
Through Blue	6				Hides	
Small		7	65	Small	600	5,949
Large		5	275	Large	4,200	39,452
Shearling	7				Shearlings	
Small		3	65	Small	900	3,406
Large		3	220	Large	2,500	9,461
Pigskin	8				Skins	
Medium		1	210	Large	3,625	5,457
Retan/Splits	9				Splits	
Small		9	70	Small	2,700	2,549
Large		5	190	Large	7,400	7,859
Total		141		80 small 61 large		
Total Industry		158		94 small 64 large		

B. Alternative Treatment Technologies Considered

Three treatment alternatives were considered for both small and large tanning plants that are classified as direct dischargers. These include:

Best Practicable Control Technology Currently Available (BPT)

Extended aeration activated sludge biological treatment, including coagulation-sedimendation with equalization.

Best Available Technology (BAT)

BAT Option I = Activated sludge.

BAT Option II = In-plant control and segregated stream pretreatment, plus activated sludge upgraded primarily by powdered activated carbon (PAC)

BAT Option III = BAT II with the addition of multimedia filtration.

Four treatment alternatives were also considered for both small and large tanning plants that discharge their wastewater to a POTW. These include:

Pretreatment Standards for Existing Sources (PSES)

PSES Option I = In-plant controls (depending on subcategory), including stream segregation and water conservation, segregated stream pretreatment, including fine screening and catalytic oxidation of beamhouse wastewater; and ph control and monitoring (ph and flow) at the combined sewer discharge

PSES I includes control capability for sulfide

PSES Option II = PSES I plus in-plant control, including chromium recovery and reuse; segregated stream pretreatment, including fine screening/equalization and coagulation-sedimentation of tanyard wastewater; and dewatering of sludges

PSES II includes control capability for sulfide and chromium

PSES Option III = Controls in addition to PSES II (depending on subcategory) as follows: segregated stream pretreatment, including flue gas coagulation-sedimentation of beamhouse wastewaters, equalization and coagulation-sedimentation of combined wastewaters in place of the same unit processes applied to segregated tanyard wastewaters

PSES III includes control capability for sulfide and chromium

PSES Option IV = Apply PSES I technology for plants represented by Chrome Tan/Pulp x-small model plants and by Nonchrome Tan small model plants. Require no treatment for plants represented by Retan/Splits small model plants. The remaining plants would be subject to PSES II technology requirements.

C. Baseline Economic Conditions and Estimated Impacts Resulting from BAT and PSES

Baseline financial conditions for small plants in contrast to large plants in the subcategory are presented on Table IX-2 and plant closure estimates in Table IX-3. In general, larger plants are in a stronger financial condition than small plants. In many cases small plants earn the same percentage return on sales or on assets; however their associated cash flows and NPVs are considerably smaller. Also, the price increase required to keep the plants net present value equal to the baseline conditions is generally higher for small plants reflecting the economies of scale in the pollution control facilities.

1. Direct Dischargers - BAT I

The existing direct discharging tanneries for which economic data were available were analyzed individually. The results of these analyses were aggregated for presentation. In general, the economic impact of the recommended BAT I is similar for small and large plants. The price increase required to maintain the same NPV is slightly higher for "small" plants. Profitability impacts are greater for "small" plants in the Chrome Tan subcategories but are more severe for "large" plants in the Nonchrome Tan subcategory. These profitability impacts are largely the result of percent of the total pollution control investment that plants must still incur, and the profitability of the individual firms.

Of the 17 direct dischargers, 14 are classified as small and 3 large. As shown in Table IX-3, all three estimated closures (including one plant that is a baseline closure) are projected to occur in the small plant category.

Table IX-2. The leather tanning and finishing industry, financial effects of options on "small" business

Model/size	Sub-category	Daily capacity	Required price increase	Return on Sales		Return on Assets		Cash Flow		Net Present Value	
				Baseline	BAT-1/ PSES II	Baseline	BAT-1/ PSES II	Baseline	BAT-1/ PSES II	Baseline	BAT-1/ PSES II
			Percent					$1000			
Direct Dischargers											
Chrome Tan	1 & 2										
Small		800	1.9	1.2	-0.8	6.5	-4.2	498	229	341	-403
Large		1,500	1.7	5.1	4.1	23.5	17.5	4500	3797	9154	6952
Nonchrome Tan	3										
Small		210	2.3	2.7	1.6	17.0	9.0	483	351	897	472
Large		715	2.1	1.9	0.5	8.7	2.0	1418	843	727	-1106
Other	4,6,7,8										
Small		2,500	0.9	2.4	1.8	11.0	7.8	1132	948	2989	2424
Indirect Dischargers											
Chrome Tan/Pulp	1	(hides)									
Small		175-1000	2.6-4.5	2.8-3.2	-1.0-1.7	15.8-16.6	-1.8-8.3	247-1264	138-1013	671-2935	248-2049
Large		2000-5400	1.2-1.9	2.3-2.6	1.5-2.0	9.3-10.8	6.1-6.8	2148-6683	1763-5833	1383-1975	-1448-642
Chrome Tan/Save	2	(hides)									
Small		500	4.8	3.1	0.9	14.9	3.9	606	433	1430	792
Large		2000	2.2	2.3	1.3	10.6	5.4	2109	1666	1905	378
Nonchrome Tan	3	(hides)									
Small		150-750	2.4-5.3	2.8-2.8	-0.7-1.0	11.7-18.3	-1.8-5.0	229-1001	121-771	610-1420	202-597
Large		2200	1.4	2.3	1.7	8.1	5.5	3730	3247	-920	-2571
Retan/Sides	4	(sides)									
Small		1350	2.8	2.0	0.8	8.0	2.9	621	491	145	-338
Large		5600	1.1	2.0	1.6	9.2	6.7	3383	3048	1976	790
No Beamhouse	5	(skins)									
Small		900-2700	2.1-2.6	2.9-3.6	1.2-2.0	12.9-16.9	4.9-8.1	191-516	135-444	500-918	284-658
Large		8600	1.0	2.4	2.0	10.0	7.9	1512	1408	1256	872
Through Blue	6	(hides)									
Small		600	2.5	2.8	1.8	18.2	10.0	789	670	2106	1663
Large		4200	0.9	1.9	1.5	13.4	10.0	3308	2695	8061	6856

(continued) . . .

Table IX-2 (continued)

Model/size	Sub-category	Daily capacity	Required price increase	Return on Sales		Return on Assets		Cash Flow		Net Present Value	
				Baseline	BAT-1/ PSES II	Baseline	BAT-1/ PSES II	Baseline	BAT-1/ PSES II	Baseline	BAT-1/ PSES II
			Percent					$1000			
	Indirect Dischargers										
Shearling	7	(shearlings)									
Small		900	4.3	3.3	1.4	11.0	4.2	526	406	881	439
Large		2500	2.4	3.2	2.2	10.2	6.5	1353	1161	1992	1291
Pigskin	8	(skins)									
Large		3625	6.1	3.5	0.5	21.7	3.0	824	472	1924	699
Retan/Splits	9	(splits)									
Small		2700	3.3	2.3	-0.5	12.4	-0.7	285	180	496	86
Large		7400	2.6	2.2	1.0	12.5	5.2	839	664	1297	656

Table IX-3. Leather tanning and finishing industry - BAT I and PSES II

Model/Size	Subcategory	Number of plants	Baseline closures	Closures	Marginal	Employment loss	Model plant capacity	Production displacement annual
		------------------------Direct Dischargers	------------------------------				Hides	Hides (000)
Chrome Tan	1 & 2							
Small		6	1	1	2	90	800	170
Large		1	0	0	0	0	1500	0
Nonchrome Tan	3							
Small		3	0	0	0	0	210	0
Large		2	0	0	0	0	715	0
Other	4, 6, 7 & 8						Skins	Skins (000)
Small		5	0	1	0	65	2500	500
		------------------------Indirect Dischargers	---------------------------				Hides	Hides (000)
Chrome Tan/Pulp	1							
Small		40	2-4	5-7	6	260-400	175-1000	1700-2200
Large		16	0	0	5	0	2000-5400	0
Chrome Tan/Save	2							
Small		3	1	0	1	0	500	0
Large		2	0	0	1	0	2000	0
Nonchrome Tan	3							
Small		7	1-2	1-2	3	45-90	150-750	30-70
Large		1	1	0	0	0	2200	0
Retan/Sides	4						Sides	Sides (000)
Small		8	1-2	0-1	2	0-105	1350	0-270
Large		7	0	0	0	0	5600	0
No Beamhouse	5						Skins	Skins (000)
Small		14	0	0	0	0	900-2700	0
Large		10	0	0	0	0	8600	0
Through Blue	6						Hides	Hides (000)
Small		7	0	0	0	0	600	0
Large		5	0	0	0	0	4200	0
Shearling	7						Shearling	Shearling (000)
Small		3	0	0	0	0	900	0
Large		3	0	0	0	0	2500	0

Continued.....

Table IX-3. Leather tanning and finishing industry (continued)

Model/Size	Subcategory	Number of plants	Baseline closures	Closures	Marginal	Employment loss	Model plant capacity	Production displacement annual
--------Indirect Dischargers--------							Hides	Hides (000)
Pigskin	8						Skins	Skins (000)
Large		1	0	0	0	0	3625	0
Retan/Splits	9						Splits	Splits (000)
Small		9	1-2	4-5	3	280-350	2700	2160-2700
Large		5	0	0	0	0	7400	0
Industry Total								
Small		105	6-11	12-17	17			
Large		53	1	0	6			
Total		158	7-12	12-17	23	740-1255		

2. Indirect Dischargers - PSES II

Chrome Tan/Pulp (1) Price increases required for small plants range from 2.6 to 4.5 percent in contrast to 1.2 to 1.9 percent for large plants. Likewise, financial impacts are more severe for small plants.

Of the forty small plants in this category, 5 to 7 are projected to close under PSES Option II compared with no estimated closures for the 16 large plants. Also, it should be noted that two to four baseline closures can be expected in contrast to no expected baseline closures for large plants.

Chrome Tan/Save (2) The price increase required for small plants is estimated at 4.8 percent in contrast to 2.2 percent for large plants. After controls profitability levels are lower for small plants. For example, after-tax returns on assets for small plants are reduced from14.9 percent to 3.9, whereas, for large the reduction is from 10.6 to 5.4 percent. The effluent controls are expected to result in one marginal situation for the small plants and one marginal situation for the two large plants.

Nonchrome Tan (3) A pattern similar to the Chrome tanners exists for the Nonchrome Tan subcategory. One to two of the seven small tanners are expected to close and an additional three placed in the marginal category. The only large plant is also expected to close as a baseline closure.

Retan/Sides (4) Control expenditures are expected to have approximately twice the impact on small plants than on large plants in this category. For example, after tax returns on assets are reduced from 8.0 percent to 2.9 percent on the small plants in contrast to a reduction from 9.2 to 6.7 percent for large plants. Likewise the NPV for small plants is reduced to negative levels. Zero to one closure is expected among the eight small plants in contrast to no closures among the seven large plants.

No Beamhouse (5) This subcategory incurs moderate economic impacts.

Through Blue (6) This subcategory incurs moderate economic impacts.

Shearling (7) This subcategory incurs moderate economic impacts.

Pigskin (8) This subcategory incurs minimal economic impacts.

Retan/Splits (9) Four to five of the nine small plants are expected to close with three subjected to marginal profitability conditions. No large plants are expected to close. This segment has been rather depressed because of a change in consumer tastes and impacts from imports. Baseline closures in 1 or 2 plants can reasonably be expected.

3. Indirect Dischargers - PSES IV

PSES IV reflects modification from PSES II in three categories, 1) chrome Tan/Pulp, 2) Nonchrome Tan, and, 3) Retan/Splits. The economic effects are the same for the remaining categories as identified in PSES II above.

Chrome Tan/Pulp (1): The extra-small plants in this subcategory are exempted from PSES II requirements and are required to meet PSES I. As a result, of the forty small plants in this subcategory one to two plants are expected to close. None of the extra small plants are expected to close.

Nonchrome Tan (3): No plant closures are expected in this subcategory. Plants represented by the small model plant are excluded from PSES II requirements and are required to meet PSES I requirements.

Retan/Splits (9): No plant closures are expected in this subcategory. Plants represented by the small model plant are excluded from PSES I and PSES II requirements, since there is no sulfide limitation under PSES I.

This modification of the regulation to exclude the smallest size plants in three subcategories, referred to for purposes of the present discussion as PSES IV, would reduce the estimated cost of compliance as follows:

Reduction	1980 dollars (millions)	1982 dollars (millions)
Capital cost	$7.84	9.33
Annualized cost	1.96	2.33

The total cost for indirect dischargers for this option (compared to the cost of PSES II in Table VII-8) would be:

PSES IV		
Capital cost	133.7	159.1
Annualized cost	37.7	44.9

APPENDIX A

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APPENDIX B

Data Used in Price Analysis

Cattlehide leather deliveries, 1972-1981

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
	------------------1,000 hide equivalents			------------------
1972	5,420	5,526	4,822	4,712
1973	4,640	4,649	4,093	4,332
1974	4,348	4,374	4,001	4,305
1975	4,259	4,840	4,829	5,269
1976	5,361	5,201	4,849	4,654
1977	4,905	4,758	4,344	4,630
1978	4,505	4,582	4,157	4,032
1979	4,202	3,749	3,458	3,523
1980	3,736	3,526	3,603	3,880
1981	3,889	4,037	3,863	3,672

Source: Tanners' Council of America

Total U.S. commercial cattle slaughter, 1972-1981

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
	------------------------1,000 head			------------------------
1972	8,692	9,026	9,011	9,045
1973	8,647	8,139	7,988	8,861
1974	8,503	8,813	9,359	10,103
1975	9,720	9,548	10,540	11,092
1976	10,911	10,169	10,907	10,657
1977	10,466	10,193	10,629	10,568
1978	10,209	9,876	9,743	9,724
1979	8,896	8,045	8,248	8,489
1980	8,146	8,193	8,615	8,853
1981	8,586	8,495	8,878	8,994

Source: Tanners' Council of America

Producers price index for upper leather, 1972-81

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
1972	118.03	138.23	139.60	156.80
1973	159.60	149.57	149.93	151.43
1974	148.13	148.00	142.33	135.30
1975	128.30	146.47	142.87	148.47
1976	159.83	179.43	179.90	177.47
1977	182.20	185.53	180.33	178.87
1978	191.50	191.67	224.30	254.83
1979	301.70	395.77	350.63	318.20
1980	319.20	283.10	287.43	303.30
1981	308.60	313.40	301.10	296.37

Source: Bureau of Labor Statistics

Heavy native steer hide price, 1972-81

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
	(¢/lb.)			
1972	20.10	27.07	32.20	39.53
1973	31.60	34.13	37.87	31.13
1974	25.87	24.63	24.87	16.53
1975	13.67	24.90	26.53	28.70
1976	29.07	36.90	36.33	29.67
1977	36.07	38.13	35.30	35.13
1978	37.67	42.37	53.20	55.40
1979	70.33	88.63	71.77	59.27
1980	45.83	36.37	46.53	49.37
1981	43.60	45.73	44.17	41.83

Source: Tanners' Council of America

Exports - U.S. hide exports, 1972-1981

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
	--------1,000 hides--------			
1972	4,061	5,167	4,463	4,512
1973	4,973	3,822	3,295	4,087
1974	4,257	4,110	4,464	5,113
1975	5,370	5,365	4,549	5,045
1976	5,978	6,256	5,869	6,215
1977	6,332	5,991	6,087	5,159
1978	5,990	6,447	5,512	6,152
1979	5,998	6,339	5,444	5,282
1980	4,753	5,235	4,668	4,864
1981	5,024	4,670	4,802	5,233

Source: Tanners' Council of America

F Exports - Foreign bovine hide exports (excluding U.S. & E.C. exports) 1972-1981

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
1972	104.65	104.65	104.65	104.65
1973	87.78	87.78	87.78	87.78
1974	89.33	89.33	89.33	89.33
1975	107.00	107.00	107.00	107.00
1976	114.20	114.20	114.20	114.20
1977	122.88	122.88	122.88	122.88
1978	123.10	123.10	123.10	123.10
1979	109.35	109.35	109.35	109.35
1980	NA	NA	NA	NA
1981	NA	NA	NA	NA

Source: USDA Foreign Agriculture Service-Foreign Agricultural Circular
Hides and Skins

Shoe imports, 1972-1981

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
	---------------------	1,000 pairs	---------------------	
1972	74,166	74,166	74,166	74,166
1973	78,879	78,879	78,879	78,879
1974	66,606	66,606	66,606	66,606
1975	71,635	71,635	71,635	71,635
1976	92,500	92,500	92,500	92,500
1977	92,017	92,017	92,017	92,017
1978	101,521	83,284	94,993	94,717
1979	110,321	103,585	105,219	85,438
1980	71,858	89,888	89,250	83,780
1981	106,672	81,678	93,382	93,873

Source: Tanners' Council of America

Producer price index (1967=100) for polyvinylchloride 1972-1981

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
1972	86.5	87.3	88.2	90.1
1973	93.3	98.0	99.1	99.1
1974	115.5	150.3	165.9	178.9
1975	178.9	163.8	167.6	170.1
1976	176.9	179.9	186.9	185.2
1977	178.1	184.6	194.6	191.3
1978	186.7	190.6	195.1	193.7
1979	204.0	216.2	229.4	245.4
1980	254.6	263.3	239.9	216.1
1981	253.3	270.1	248.8	219.6

Source: Bureau of Labor Statistics

Domestic shoe prices-estimated average factory value per pair, 1972-1981

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
	(U.S. $)			
1972	5.49	5.56	5.63	5.60
1973	6.28	6.16	6.28	6.33
1974	6.77	6.84	7.03	7.40
1975	7.54	7.56	7.46	7.46
1976	7.98	8.21	8.43	8.56
1977	8.55	8.58	8.44	8.63
1978	8.55	9.42	9.16	9.76
1979	9.75	10.24	10.78	11.03
1980	NA	NA	NA	NA
1981	NA	NA	NA	NA

Source: Tanners' Council of America

Domestic shoe production, 1972-1981

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
	1,000 pairs			
1972	137,541	135,535	127,578	126,001
1973	130,624	124,860	115,097	117,745
1974	120,264	114,845	95,115	94,919
1975	98,328	103,387	112,360	119,414
1976	121,312	121,441	104,452	96,882
1977	96,814	97,323	92,457	97,738
1978	102,238	104,291	90,555	93,113
1979	106,150	97,764	86,315	91,137
1980	104,322	102,239	93,235	97,055
1981	96,446	95,312	90,558	93,157

Source: Tanners' Council of America

Leading Indicators, 1972-1981

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
1972	110.3	113.2	115.6	119.4
1973	123.9	125.3	126.7	126.0
1974	126.9	129.3	129.3	113.6
1975	105.6	111.6	118.0	119.2
1976	122.1	124.4	125.5	126.9
1977	127.9	130.0	131.1	134.5
1978	134.9	136.9	137.0	143.4
1979	142.8	140.0	140.4	136.0
1980	135.7	135.6	132.6	NA
1981	NA	NA	NA	NA

Source: Bureau of Labor Statistics - Business Conditions Digest

Coincident Indicators 1972-1981

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
1972	107.7	110.7	113.3	118.1
1973	121.4	123.0	124.6	126.4
1974	124.0	123.7	123.8	120.2
1975	108.0	106.8	110.9	114.1
1976	120.0	122.1	123.0	124.2
1977	126.8	129.6	130.8	133.3
1978	133.9	138.2	139.6	144.3
1979	145.5	145.0	144.9	144.9
1980	NA	NA	NA	NA
1981	NA	NA	NA	NA

Source: Bureau of Labor Statistics - Business Conditions Digest

Rate of exchange index for U.S. dollars, 1972-81

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
1972	107.5	107.0	107.7	104.5
1973	100.0	96.2	96.8	100.7
1974	100.4	100.6	101.0	99.0
1975	97.1	100.0	103.4	104.0
1976	105.0	105.3	105.2	105.3
1977	105.3	104.5	103.2	100.6
1978	97.4	94.8	91.0	90.6
1979	92.0	92.5	92.0	92.2
1980	94.4	94.3	92.0	94.3
1981	97.4	106.0	111.1	107.4

Source: Federal Reserve Bank of St. Louis

WPI - Wholesale price index 1972-1981

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
1972	1.17	1.18	1.20	1.21
1973	1.27	1.33	1.39	1.40
1974	1.49	1.55	1.65	1.71
1975	1.71	1.73	1.77	1.79
1976	1.80	1.82	1.84	1.86
1977	1.90	1.95	1.95	1.97
1978	2.02	2.08	2.11	2.16
1979	2.24	2.33	2.39	2.48
1980	2.59	2.64	2.73	2.79
1981	2.88	2.94	2.96	2.96

Source: Bureau of Labor Statistics